

Northeast Wood Markets Retention and New Market Recruitment Initiative

North East *State* Foresters Association



REPORT Section II: The unique regional attributes, weaknesses and opportunities for wood market maintenance and growth

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Produced by the North East *State* Foresters Association for the Northern Forest Center, U.S. Department of Commerce Economic Development Administration and the U.S. Endowment for Forestry & Communities.

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Section 2: Unique regional attributes, weaknesses and opportunities for wood market maintenance and growth in New Hampshire, New York and Vermont.

A. Timber inventories/wood supply/existing demands by sector

The data, information and analyses in the first Section of this report series provides most of the background for analyses of timber inventories, wood supply and existing timber demands in the 3-state region. We will cover these topics by state in this Section. Most of the data is from the USDA Forest Service Forest Inventory and Analysis (FIA) and other sources are noted.

I. New Hampshire

Standing Timber

Both New Hampshire North and South sub-regions show substantial timber resources available for existing, expanded and potential new wood using manufacturers. Figure 1 summarizes the highlights of the FIA timber inventory data for NH North and South.

Figure 1 Important Timber Statistics for New Hampshire (USDA Forest Service FIA data)

Sub-Region	Timberland % (of land and water				Standing Timber (cords/acre)	Standing timber high value (cu.ft.)	Standing timber low value (cu.ft.)	TOTAL Standing Timber (cu. ft.)	Total Standing (cords)
	Timberland Acreage	area)	Private Land	Public Land					
North	2,342,555	80%	67%	33%	22.4	2,398,792,140	1,793,777,465	4,192,569,605	52,407,120
South	2,077,449	69%	88%	12%	31.8	3,543,927,624	1,747,361,983	5,291,289,607	66,141,120
TOTAL	4,420,004	74%	77%	23%	26.8	5,942,719,764	3,541,139,448	9,483,859,212	118,548,240
NH ANNUAL NET GROWTH V. REMOVALS									
		NORTH	SOUTH	Total	Total cords				
2019	Net Growth	cubic feet	cubic feet						
	all	82,935,275	90,948,195	173,883,470	2,173,543				
	public	22,407,446	7,457,125	29,864,571	373,307				
	private	60,402,270	83,491,070	143,893,340	1,798,667				
	Removals								
	all	60,122,928	30,858,407	90,981,335	1,137,267				
	public	6,065,591	1,384,825	7,450,416	93,130				
	private	52,560,109	29,473,582	82,033,691	1,025,421				
	Growth less Removals								
	all	22,812,347	60,089,788	82,902,135	1,036,277				
	public	16,341,855	6,072,300	22,414,155	280,177				
	private	7,842,161	54,017,488	61,859,649	773,246				
Net Growth to Removals RATIO									
		1.40	2.90	1.91					

New Hampshire has over 4.4 million acres of timberland, the vast majority of which (77%) is in private ownership where the likelihood of timber harvest is greatest.

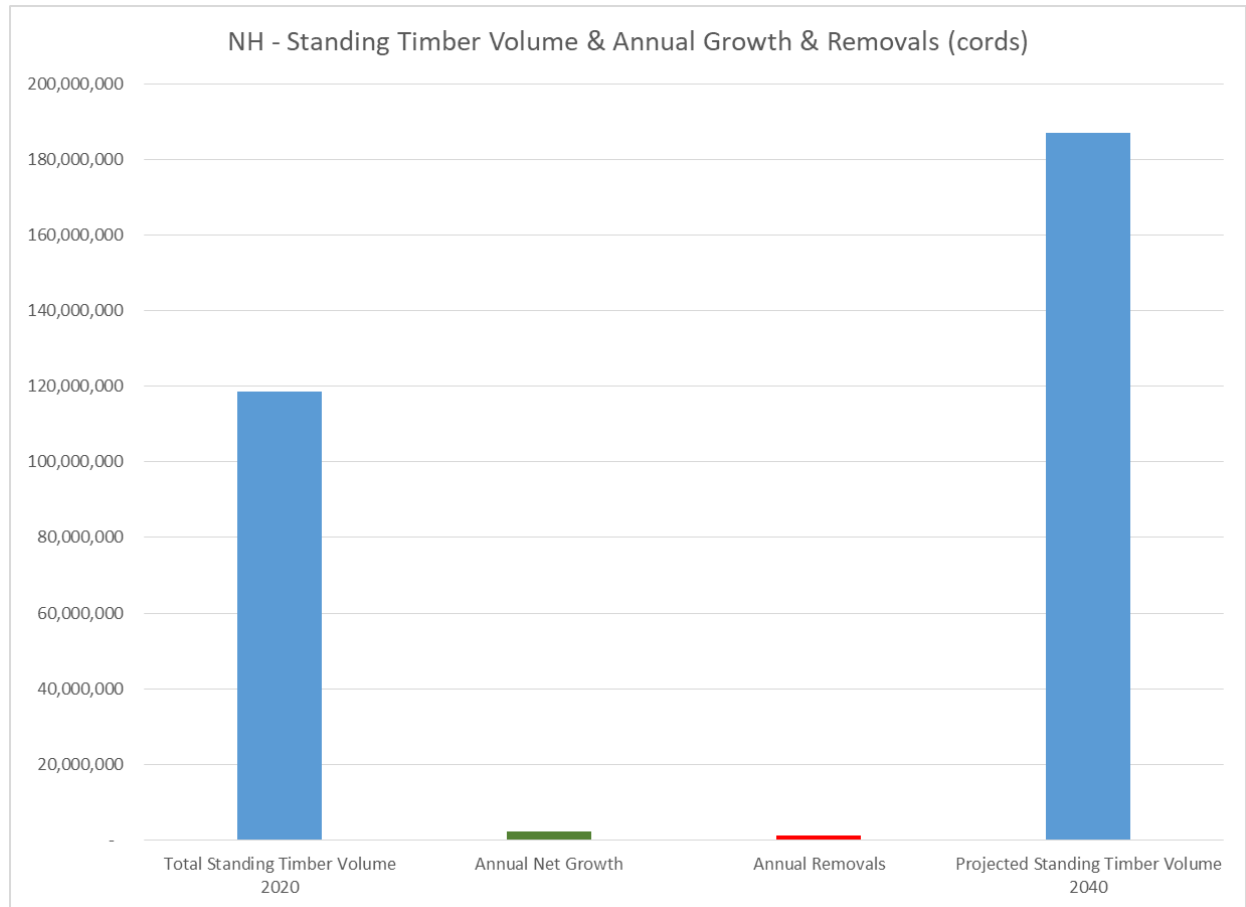
Both the North and South sub-regions of New Hampshire have substantial standing timber volumes available for expansion of both high quality and low quality wood uses. These lands have over 118 million cords of standing timber. Average standing volume of almost 27 cords per acre for the State is substantial. For most tree species and mid-aged forests such as those growing in New Hampshire, 20 cords per acre would be considered full stocking. An overstocked forest, which much of the State's forests might be considered, is not growing to its potential. There is ample opportunity for increased timber harvests to supply expanded or new forest products manufacturing through sustainable additional timber harvesting that can improve the remaining forest growth. If at high enough levels, this additional harvesting will trend forests to a less overstocked state.

Growth vs. Removals

The net growth to removals ratio – meaning the ratio of timber growing each year (after accounting for natural mortality of trees) to the amount harvested and taken out of production due to land use change is 1.91 for New Hampshire. This means that for every 1 unit of harvest/removal each year, we are growing 1.91 units. This means that our forests are adding a substantial amount of standing inventory each year (Figure 2).

Even with expanded harvesting, modeled in the BPE model at an increase of 5% per year for 20 years, forests in NH will continue to add standing inventory (Figure 2). Over the 20-year project future using the BPE model (see Section 1 of this report), New Hampshire's standing inventory will increase by over 40%. Our firm conclusion is that there is more than ample opportunity for additional timber harvesting while NH's forests continue to add inventory.

Figure 2 NH Standing Timber Volume 2020-2040 (FIA data & BPE model)



Commercial Tree Species

In both NH sub-regions, the leading standing timber species in volume terms, are all highly sought-after commercial species. In the North, the major species (starting with largest standing volume species) are: Spruce & Balsam Fir, Sugar Maple, Red Maple, Yellow Birch & White Pine. In the South, the major species are: White Pine, Red Oak, Red Maple, Eastern Hemlock & Sugar Maple.

Accessible Annual Timber Volume

Although substantial timber volumes are growing and being added to standing timber volumes each year in New Hampshire, this does not necessarily mean all of this timber is available for harvest each year. To be very conservative, the BPE model removes acreage of available timber from consideration due to: slope, elevation, wetlands, distance to roads, deer yards, stream buffers, conservation easements and ownership type (public or private). The chosen discounts remove over 50% of the timberland acreage in making its estimates of current and future accessible/available timber.

For New Hampshire, with this very conservative discount estimate, in addition to current harvest levels with an added increase of 5% each year, the modeled results show that at present, at least 28,558,224 cubic feet (356,978 cords) of timber are available statewide annually for expanded or new markets. In 2040, that number increases to 48,150,193 cubic feet (601,877 cords). While we believe more than this amount can be made available for forest products markets, these are solid conservative annual available/accessible timber volumes not already utilized by existing wood-using industries, even with the projected additional annual 5% increase.

Existing demands from current timber users in NH

The modeled accessible/available timber volumes discussed above already take into account existing annual use of timber in NH, although not the losses from closures of several wood-fired power plants in 2019-20¹. In this section we will further quantify the existing users of this timber. This analysis covers primary users of timber, i.e. those users whose raw material is logs or chips directly from the forest. Other secondary users, such as furniture manufacturers or paper mills that purchase raw pulp (pulpwood users are included), are not included.

Figure 3 Existing Primary Timber Users in NH (data from 2017-20)

Type of Primary Wood User	# of facilities	Estimated Annual Total Timber Use (cords)
Sawmills	60	421,290
Electricity (Power) Plants	4	360,000
Commercial Biomass Thermal Users (chips)	35	16,000
Wood Pellet Plants	1	80,000
Firewood	unknown	200,000
TOTAL		1,077,290

Sources: UNH Cooperative Extension, NH Division of Forests and Lands, NH Division of Air Resources, NH Wood Energy Council, Innovative Natural Resource Solutions, LLC

Existing primary users of timber in New Hampshire annually use approximately 1.08 million cords (2.59 million tons) of timber each year. Most of this volume comes from forests in New Hampshire but some timber moves to markets across state lines – both import and export – from adjacent states and Canadian provinces.

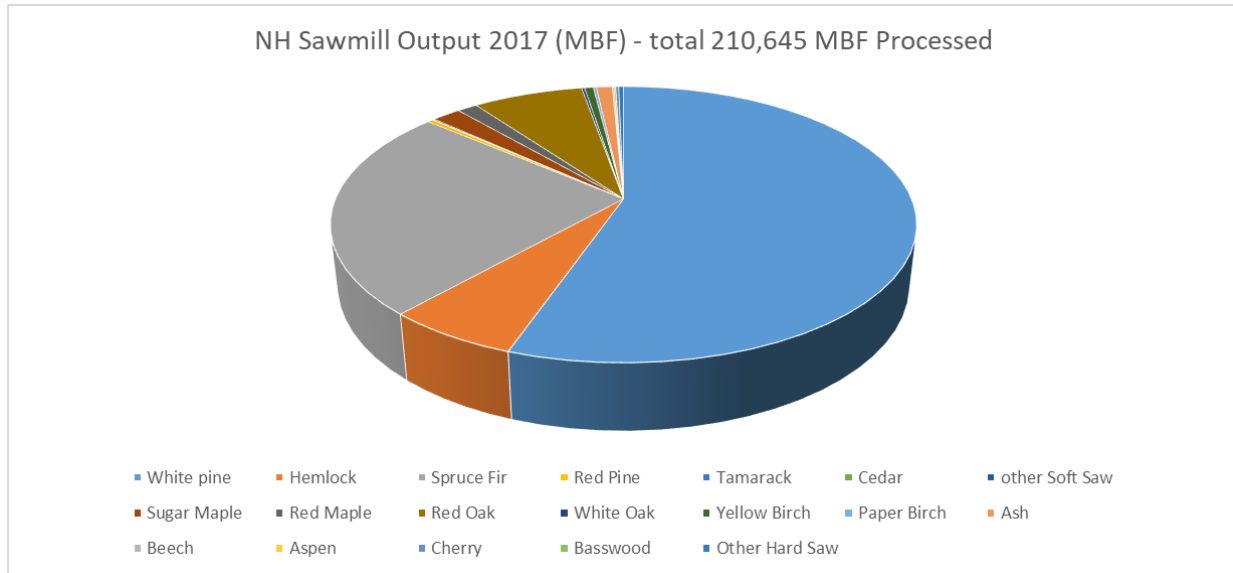
¹ These closures free up over an additional million tons (400,000 cords) of low-grade timber annually in addition to the 356,798 cords cited above.

Sawmills are now the largest users of timber in the State at 421,290 cords per year, followed by the biomass electricity plants. Prior to 2020, the biomass electricity plants had, for over 20 years, been the largest primary users of timber in the State. Market forces in electricity markets have in recent years caused most of the biomass electricity plants to no longer be economical. Half of the eight biomass plants have likely shut down permanently with others likely to follow. While the biomass plants do not compete directly for timber with the sawmills because the sawmills use higher quality timber while the biomass plants use low-quality timber, they are connected. Sawmills must have outlets for their residues, coming from the slabs that are removed when an essentially round raw material (log) is manufactured into square products (timbers and boards). The loss of those biomass electricity plants has caused hardships for sawmills who now receive less for selling their residues with the prospect of not being able to sell them at all due to the loss of these low-grade markets – both biomass electricity and reduced pulpwood markets.

Firewood, used to heat buildings in wood stoves, boilers and furnaces, is a substantial use of hardwood timber in New Hampshire at approximately 200,000 cords per year. There is no accurate source of data to estimate this use because so much of it is not tracked through conventional means. The one substantive source of firewood use data is through the State of NH Report of Cut data. This data is from reports filed with the state after timber harvests have been completed outlining the volume of products harvested. This data suggests that in commercial harvesting operations only about one-quarter of the 200,000 cords is harvested. But much of the firewood in the marketplace comes from individuals harvesting their own – and this does not need to be reported. Firewood user survey data within the northeast region in other states suggest that a lot more is used than conventional sources of data suggest.

As for species use among the various markets, sawmill reporting data is the only source of species use data available (Figure 4). This data shows the

Figure 4 NH Sawmill Output Data by Species 2017



vast majority used is White Pine. Next highest use is Spruce-Fir and then Eastern Hemlock and Sugar Maple.

II. New York

Standing Timber

All New York sub-regions show substantial timber resources available for existing, expanded and potential new wood using manufacturers. Figure 5 summarizes the highlights of the FIA timber inventory data for NY North, South, West and Lower Hudson sub-regions.

Figure 5 Important Timber Statistics for New York (USDA Forest Service FIA data)

Sub-Region	Timberland Acreage	Timberland % (of land and water area)	Private Land	Public Land	Standing Timber (cords/acre)	Standing timber high value (cu.ft.)	Standing timber low value (cu.ft.)	TOTAL Standing Timber (cu. ft.)	Total Standing (cords)
North Country	6,180,290	51%	91%	9%	22.1	6,483,350,034	4,378,693,608	10,862,043,642	135,775,546
Southern Tier	4,387,314	61%	87%	13%	26.8	5,907,533,327	3,511,485,378	9,419,018,705	117,737,734
West	2,486,248	38%	88%	12%	26.3	3,327,825,990	1,909,836,812	5,237,662,802	65,470,785
Lower Hudson	2,097,377	54%	89%	11%	30.1	3,333,392,379	1,718,971,636	5,052,364,015	63,154,550
TOTAL	15,151,229	51%	89%	11%	25.2	19,052,101,730	11,518,987,434	30,571,089,164	382,138,615
NY ANNUAL NET GROWTH V. REMOVALS									
2019	NORTH	SOUTH	WEST	LOWER HUDSON	Total	Total cords			
Net Growth	cubic feet	cubic feet	cubic feet	cubic feet					
all	230,139,907	205,957,986	117,917,695	74,755,318	628,770,906	7,859,636			
public	20,921,500	24,228,815	12,478,488	7,936,766	65,565,569	819,570			
private	208,987,289	181,264,983	105,320,327	68,268,035	563,840,634	7,048,008	Major Tree Species (standing volume decending order)		
							North	South	
Removals							Red and Sugar Maple		Red and Sugar Maple
all	130,812,739	66,875,378	45,143,277	18,134,856	260,966,250	3,262,078	White Pine		White Pine
public	20,640,025	6,340,234	6,245,285	122,532	33,348,076	416,851	Eastern Hemlock		Ash
private	103,101,469	52,137,859	35,016,857	14,141,267	204,397,452	2,554,968	Spruce-Fir		Eastern Hemlock
							West	Lower Hudson	
less Removals							Sugar and Red Maple		Red Oaks
all	99,327,168	139,082,608	72,774,418	56,620,462	367,804,656	4,597,558	Ash		White Pine
public	281,475	17,888,581	6,233,203	7,814,234	32,217,493	402,719			
private	105,885,820	129,127,124	70,303,470	54,126,768	359,443,182	4,493,040	Other hardwoods		Sugar & Red Maple
Net Growth to Removals RATIO	1.76	3.08	2.61	4.12	2.41				

New York has over 15.1 million acres of timberland, the vast majority of which (89%) is in private ownership where the likelihood of timber harvest is greatest.

All four sub-regions of New York – North Country, Southern Tier, West and Lower Hudson - have substantial standing timber volumes available for expansion of both high quality and low quality wood uses. These lands have over 382 million cords of standing timber. Average standing volume of over 25 cords per acre for the State is substantial. For most tree species and mid-aged forests such as those growing in New York, 20 cords per acre would be considered full stocking.

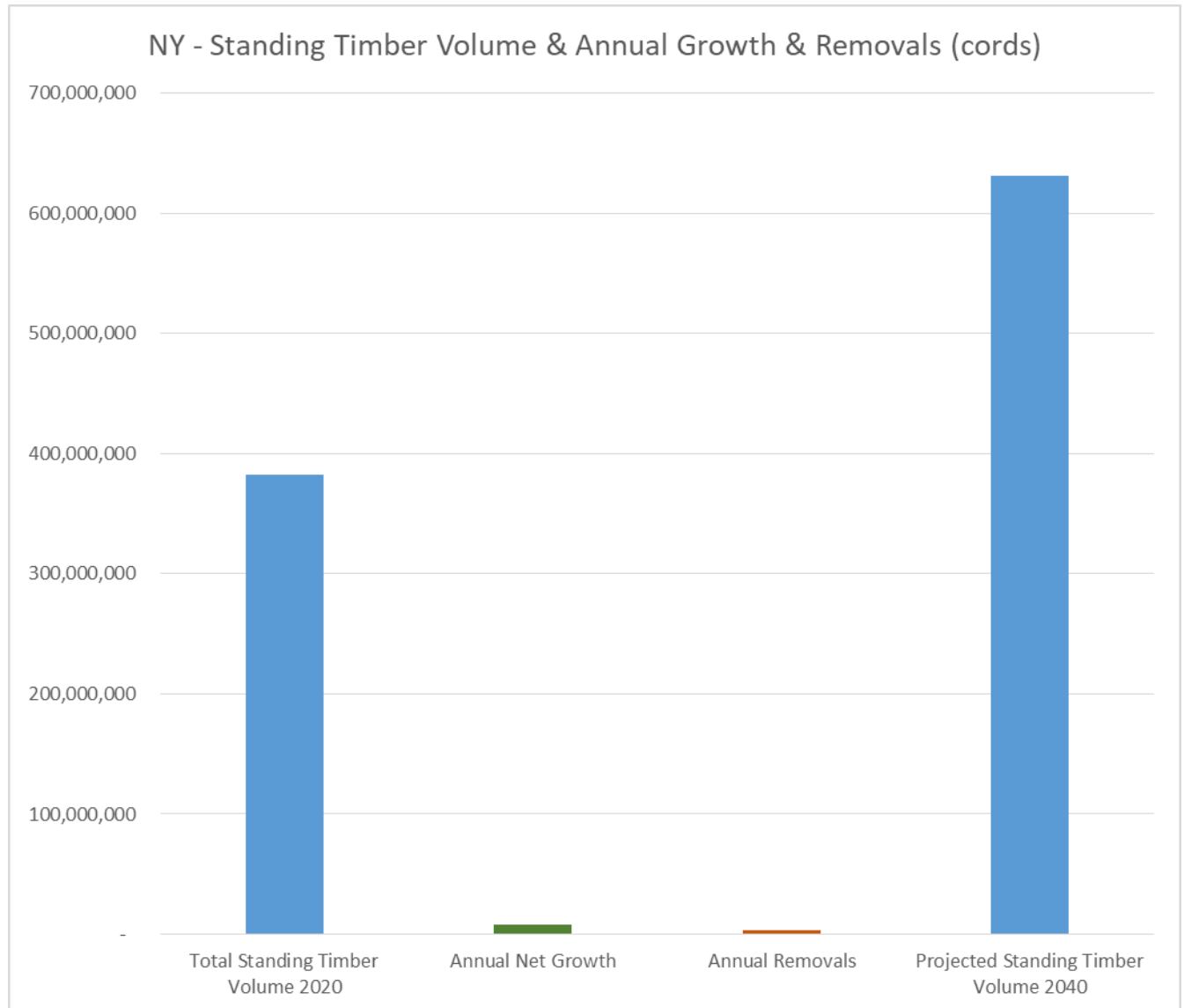
An overstocked forest, which much of the State's forests might be considered, is not growing to its potential. There is ample opportunity for increased timber harvests to supply expanded or new forest products manufacturing through sustainable additional timber harvesting that can improve the remaining forest growth. If at high enough levels, this additional harvesting will trend forests to a less overstocked state.

Growth vs. Removals

The net growth to removals ratio – meaning the ratio of timber growing each year (after accounting for natural mortality of trees) to the amount harvested and taken out of production due to land use change is 2.41 for New York. This means that for every 1 unit of harvest/removal each year, we are growing 2.41 units. This means that our forests are adding a substantial amount of standing inventory each year (Figure 6).

Even with expanded harvesting, modeled in the BPE model at an increase of 5% per year for 20 years, forests in NY will continue to add standing inventory (Figure 6). Over the 20-year project future using the BPE model (see Section 1 of this report), New York's standing inventory will increase by over 65%. Our firm conclusion is that there is more than ample opportunity for additional timber harvesting while NY's forests continue to add inventory.

Figure 6 NY Standing Timber Volume 2020-2040 (FIA data & BPE model)



Commercial Tree Species

In all four NY sub-regions, the leading standing timber species in volume terms are all highly sought after commercial species. In the North Country the major species (starting with largest standing volume species) are: Red and Sugar Maple, White Pine, Eastern Hemlock & Spruce-Fir. In the Southern Tier, the major species are: Red and Sugar Maple, White Pine, Ash, Eastern Hemlock. In the West the major species are: Sugar and Red Maple, Ash & Other hardwoods. And in the Lower Hudson, the major species are: Red Oak, White Pine, Sugar & Red Maple.

Accessible Annual Timber Volume

Although substantial timber volumes are growing and being added to standing timber volumes each year in New York, this does not necessarily mean all of this timber is available for harvest each year. To be very conservative, the BPE model removes acreage of available timber from consideration due to: slope, elevation, wetlands, distance to roads, deer yards, stream buffers, conservation easements and ownership type (public or private). The chosen discounts remove over 50% of the timberland acreage in making its estimates of current and future accessible/available timber.

For New York, with this very conservative discount estimate, in addition to current harvest levels with an added increase of 5% each year, the modeled results show that at present, at least 107,195,869 cubic feet (1,339,948 cords) of timber are available statewide annually for expanded or new markets. In 2040, that number increases to 221,097,751 cubic feet (2,763,722 cords). While we believe more than this amount can be made available for forest products markets, these are solid conservative annual available/accessible timber volumes not already utilized by existing wood-using industries, even with the projected additional annual 5% increase.

Existing demands from current timber users in NY

The modeled accessible/available timber volumes discussed above already take into account existing annual use of timber in NY. In this section we will further quantify the existing users of this timber. This analysis covers primary users of timber, i.e. those users whose raw material is logs or chips directly from the forest. Other secondary users, such as furniture manufacturers or paper mills that purchase raw pulp (pulpwood users are included), are not included.

Figure 7 Existing Primary Timber Users in NY (data from 2017-20)

Type of Primary Wood User	# of facilities	Estimated Annual Total Timber Use (cords)
Sawmills	138	1,034,000
Electricity (Power) Plants	1	220,000
Commercial Biomass Thermal Users (chips)	40	20,000
Wood Pellet Plants	7	166,667
Pulp and Paper Mills	2	710,000
Firewood	unknown	1,000,000
TOTAL		3,150,667

Sources: NY DEC Division of Lands & Forests, Innovative Natural Resource Solutions, LLC

Existing primary users of timber in New York annually use approximately 3.2 million cords (7.88 million tons) of timber each year. Most of this volume comes from forests in New York but some timber moves to markets across state lines – both import and export – from adjacent states and Canadian provinces.

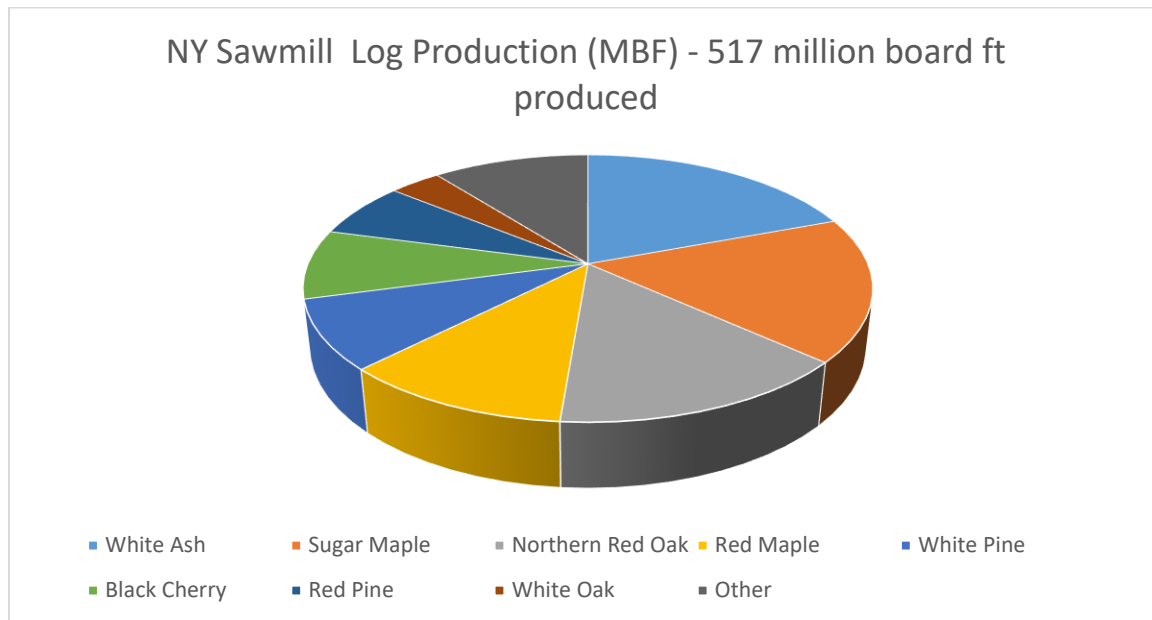
Sawmills are by far the largest users of timber in the State at 1.034 million cords per year, followed by its two pulp and paper mills at 710,000 cords.

Sawmills must have outlets for their residues, coming from the slabs that are removed when an essentially round raw material (log) is manufactured into square products (timbers and boards). The State's lack of low-grade markets in the Western region has caused hardships for sawmills that largely do not have access to the two eastern pulp mills given the distance to market.

Firewood, used to heat buildings in wood stoves, boilers and furnaces, is a substantial use of hardwood timber in New York at approximately 1,000,000 cords per year. There is no accurate source of data to estimate this use because so much of it is not tracked through conventional means. In addition to large commercial firewood producers, of which there are many in New York as a whole, much of the firewood in the marketplace comes from individuals harvesting their own – and this is not easily quantified. Firewood user survey data within the northeast region in other states suggest that a million cords of annual use is not unreasonable.

As for species use among the various markets, sawmill log production reporting data is the only source of species use data available (Figure 8). These data show the majority produced is White Ash followed closely by Sugar Maple, Northern Red Oak and Red Maple.

Figure 8 NY Sawmill Log Production by Species 2018



Source: NY Division of Lands & Forests

III. Vermont

Standing Timber

Vermont's two sub-regions show substantial timber resources available for existing, expanded and potential new wood using manufacturers. Figure 9 summarizes the highlights of the FIA timber inventory data for the Vermont North and South sub-regions.

Figure 9 Important Timber Statistics for Vermont (USDA Forest Service FIA data)

Sub-Region	Timberland % (of land and water area)				Standing Timber (cords/acre)	Standing timber high value (cu.ft.)	Standing timber low value (cu.ft.)	TOTAL Standing Timber (cu. ft.)	Total Standing (cords)
	Timberland Acreage		Private Land	Public Land					
North	2,223,811	72%	87%	13%	22.9	2,347,495,986	1,734,489,110	4,081,985,096	51,024,814
South	2,051,841	67%	79%	21%	29.4	3,208,142,809	1,624,694,537	4,832,837,346	60,410,467
TOTAL	4,275,652	69%	83%	17%	26.1	5,555,638,795	3,359,183,647	8,914,822,442	111,435,281
VT ANNUAL NET GROWTH V. REMOVALS									
2019	NORTH	SOUTH	Total	Total cords					
Net Growth	cubic feet	cubic feet							
all	82,058,538	81,881,269	436,097,893	5,451,224			Major Tree Species (standing volume decending order)		
public	7,638,883	12,444,892	45,150,315	564,379			<i>North</i>		<i>South</i>
private	74,243,183	68,953,481	390,252,272	4,878,153			Sugar Maple		Sugar Maple
							Spruce-Fir		Red Maple
Removals							Eastern Hemlock		White Pine
all	40,148,109	37,667,452	197,688,117	2,471,101			Yellow Birch		Eastern Hemlock
public	1,182,887	3,713,203	26,980,259	337,253					
private	37,218,325	24,319,105	155,239,328	1,940,492					
rowth less Removals									
all	41,910,429	44,213,817	238,409,776	2,980,122					
public	6,455,996	8,731,689	18,170,056	227,126					
private	37,024,858	44,634,376	235,012,944	2,937,662					
Net Growth to Removals RATIO	2.04	2.17	2.21						

Vermont has nearly 4.2 million acres of timberland, the vast majority of which (83%) is in private ownership where the likelihood of timber harvest is greatest.

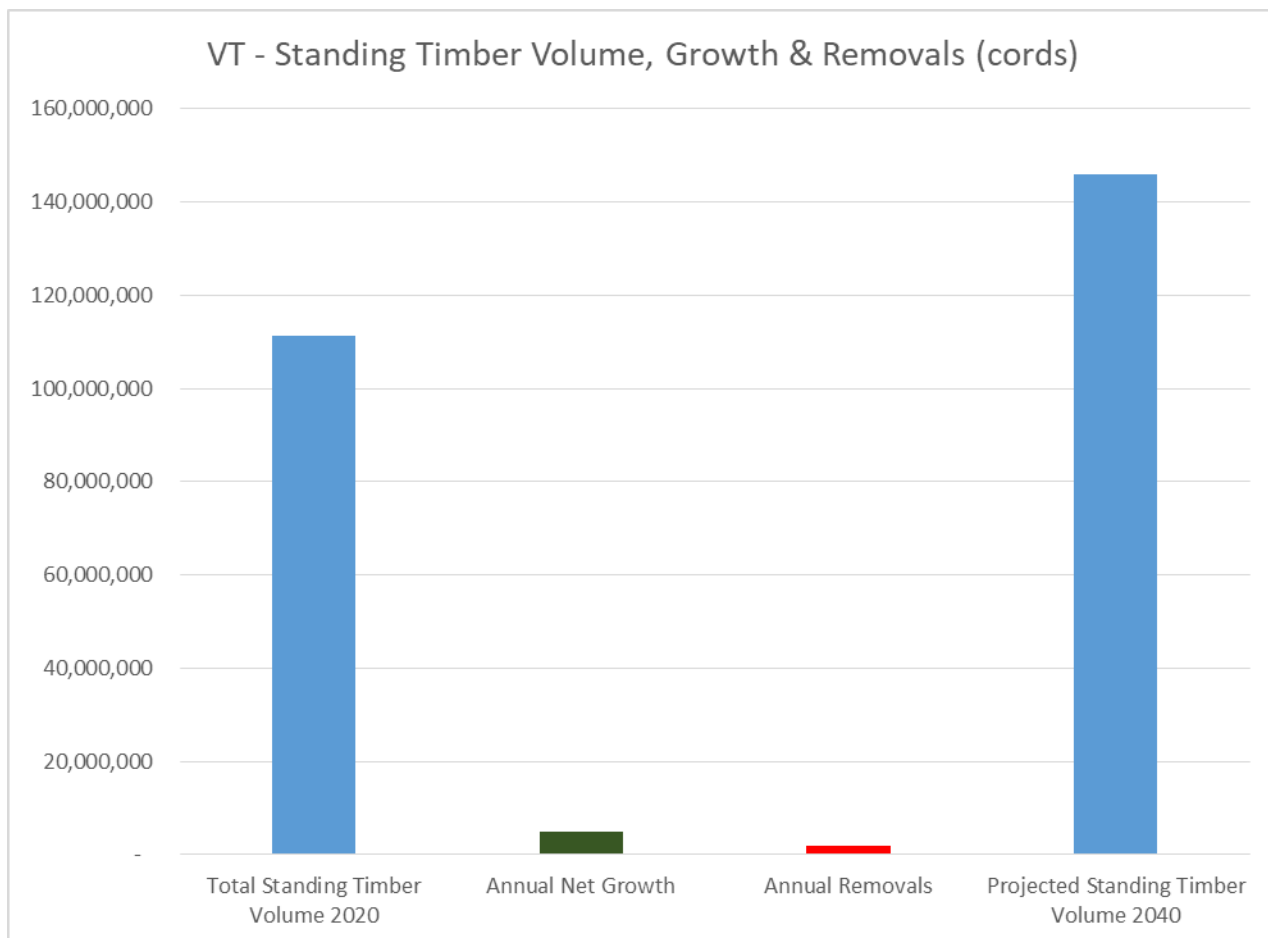
All two sub-regions of Vermont – North & South - have substantial standing timber volumes available for expansion of both high quality and low quality wood uses. These lands have over 111 million cords of standing timber. Average standing volume of over 26 cords per acre for the State is substantial. For most tree species and mid-aged forests such as those growing in Vermont, 20 cords per acre would be considered full stocking. An overstocked forest, which much of the State's forests might be considered, is not growing to its potential. There is ample opportunity for increased timber harvests to supply expanded or new forest products manufacturing through sustainable additional timber harvesting that can improve the remaining forest growth. If at high enough levels, this additional harvesting will trend forests to a less overstocked state.

Growth vs. Removals

The net growth to removals ratio – meaning the ratio of timber growing each year (after accounting for natural mortality of trees) to the amount harvested and taken out of production due to land use change is 2.21 for Vermont. This means that for every 1 unit of harvest/removal each year, Vermont's forests are growing 2.21 units. This means that our forests are adding a substantial amount of standing inventory each year (Figure 10).

Even with expanded harvesting, modeled in the BPE model at an increase of 5% per year for 20 years, forests in VT will continue to add standing inventory (Figure 10). Over the 20-year project future using the BPE model (see Section 1 of this report), Vermont's standing inventory will increase by over 31%. Our firm conclusion is that there is more than ample opportunity for additional timber harvesting while VT's forests continue to add inventory.

Figure 10 VT Standing Timber Volume 2020-2040 (FIA data & BPE model)



Commercial Tree Species

In the two VT sub-regions, the leading standing timber species in volume terms are all highly sought after commercial species. In the North, the major species (starting with largest standing volume species) are: Sugar Maple, Spruce-Fir Eastern Hemlock & Yellow Birch. In the South, the major species are: Sugar Maple, Red Maple, White Pine & Eastern Hemlock.

Accessible Annual Timber Volume

Although substantial timber volumes are growing and being added to standing timber volumes each year in Vermont, this does not necessarily mean all of this timber is available for harvest each year. To be very conservative, the BPE model removes acreage of available timber from consideration due to: slope, elevation, wetlands, distance to roads, deer yards, stream buffers, conservation easements and ownership type (public or private). The chosen discounts remove over 50% of the timberland acreage in making its estimates of current and future accessible/available timber.

For Vermont, with this very conservative discount estimate, in addition to current harvest levels with an added increase of 5% each year, the modeled results show that at present, at least 27,350,314 cubic feet (341,879 cords) of timber are available statewide annually for expanded or new markets. In 2040, that number increases to 67,631,865 cubic feet (845,398 cords). While we believe more than this amount can be made available for forest products markets, these are solid conservative annual available/accessible timber volumes not already utilized by existing wood-using industries, even with the projected additional annual 5% increase.

Existing demands from current timber users in VT

The modeled accessible/available timber volumes discussed above already take into account existing annual use of timber in VT. In this section we will further quantify the existing users of this timber. This analysis covers primary users of timber, i.e. those users whose raw material is logs or chips directly from the forest. Other secondary users, such as furniture manufacturers or paper mills that purchase raw pulp (pulpwood users are included), are not included.

Figure 11 VT Existing Primary Timber Users (data from 2017-2020)

Type of Primary Wood User	# of facilities	Estimated Annual Total Timber Use (cords)
Sawmills	51	175,960
Electricity (Power) Plants	2	250,000
Commercial Biomass Thermal Users (chips)	75	74,000
Wood Pellet Plants	1	10,000
Firewood	101,000 households	400,000
TOTAL		909,960

Sources: VT Dept. of Forests, Parks & Recreation, Innovative Natural Resource Solutions, LLC

Existing primary users of timber in Vermont annually use approximately 910,000 cords (2.3 million tons) of timber each year. Most of this volume comes from forests in Vermont but some timber moves to markets across state lines – both import and export – from adjacent states and Canadian provinces.

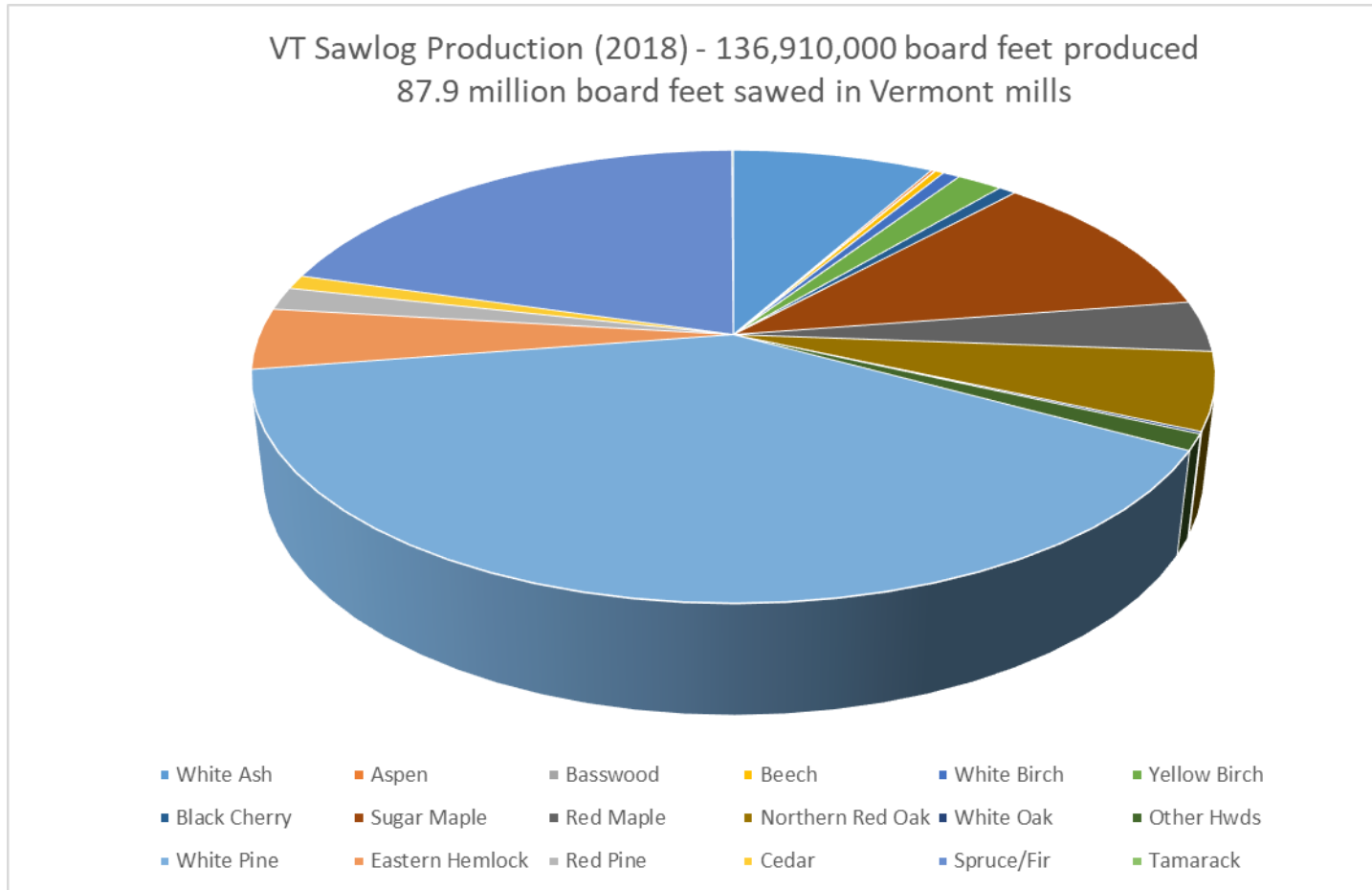
Firewood, electric power plants and then sawmills are by far the largest users of timber in the State. Firewood is about 400,000 cords a year, while power plants use 250,000 cords. Sawmills – which use a high value log compared to low-value firewood and power plant chips – use about 176,000 cords a year.

Sawmills must have outlets for their residues, coming from the slabs that are removed when an essentially round raw material (log) is manufactured into square products (timbers and boards). The State's lack of enough low-grade markets has caused hardships for sawmills that largely do not have access to distance low-grade market.

As written above, firewood, used to heat buildings in wood stoves, boilers and furnaces, is a substantial use of hardwood timber in Vermont at approximately 400,000 cords per year. There is no accurate source of data to estimate this use because so much of it is not tracked through conventional means. In addition to large commercial firewood producers, much of the firewood in the marketplace comes from individuals harvesting their own – and this is not easily quantified. Firewood user survey data within Vermont suggest that 400,000 cords of annual use is not unreasonable.

As for species use among the various markets, sawmill log production reporting data is the only source of species use data available (Figure 12). This data shows the majority produced is White Pine followed by Spruce/Fir and then Sugar Maple, and then White Ash.

Figure 12 VT Sawlog Production & Mill Production 2018



Source: VT Department of Forests, Parks & Recreation

B. Supply Chain Infrastructure

The supply chain for the primary forest products industry in New Hampshire, New York and Vermont includes all the businesses whose job is to get the raw timber and chips from the forest to the various markets discussed in the previous section. This supply chain includes foresters, loggers, truckers and primary processor users such as sawmills, pulp mills and energy facilities as well as those businesses that provide services to these businesses. That includes equipment and parts suppliers, fuel suppliers and others that service the forest products businesses of the region. Figure 13 shows the number of businesses in these sub-sectors by state².

Figure 13 Primary Forest Products Industry Supply Chain NH, NY & VT

Industry Category	New Hampshire	New York	Vermont	TOTAL
Foresters	177	80	292	549
Logger/Truckers	305	635	309	1249
Sawmills	61	154	50	265
Pulp & Paper mills	0	2	0	2
Biomass Power Plants	4	1	2	7
Concentration Yards	17	15	20	52

Foresters, although licensed in New Hampshire and Vermont (but not in New York), are not required for a timber harvest to take place. There are estimates developed through the National Woodland Owners Survey of the USDA Forest

² Foresters – Though not always present on a logging operation, foresters are land managers and generally work for the landowner both private and public sector. Foresters develop and work to implement forest management plans to achieve specific outcomes desired by the landowner.

Loggers/Truckers – Loggers harvest timber from private and public lands, often at the direction of the landowner or landowner forester. Truckers, often employed by loggers, bring harvested timber (in the form of logs, pulpwood, firewood and wood chips) from the forest harvest site to the wood-using industry.

Sawmills – Sawmills take higher quality logs cut and delivered by loggers and their truckers and saw them into many forms of squared solid wood product including (depending on the species) boards, two-by-fours and other two inch thick material, and various timbers from round-edge cabin logs to squared timbers. Not included here because the sector uses the highest quality logs like those used by sawmills, veneer mills slice or peel logs into thin sheets of solid wood used to make plywood. There are few veneer mills in this region.

Pulp & Paper mills – Pulp and Paper mills use a slightly lower quality log than sawmills – pulpwood – to make paper and paper-like products. There are currently only two operating pulp mills in the 3-state region – both in New York.

Biomass Power Plants – Biomass Power Plants burn wood chips in a large boiler attached to a generator turbine that delivers electricity to the power grid.

Wood Pellet mills - Wood Pellet mills in these states make wood pellets for building heating and use low grade roundwood and wood chips as wood feedstock for their operations.

Concentration yards - Concentration yards are businesses that purchase harvested timber and wood chips from loggers and sawmills. These businesses then re-sell the products to various primary processor facilities.

Service suggest foresters are involved in a timber sale on family forest ownerships (smaller forests owned by individuals and families) on only about 20% of the acres harvested in the three-state region. For larger business ownerships and public land, a forester is almost always involved in a timber harvest. So a forester is involved in a harvest on over half of the acres harvested (but less than half of the number of harvests).

For every harvest, a logger – often more than one person in the logging company – and a trucker or truckers, are involved. Logging companies come in all sizes. Small one-person logging companies are still found in all three states (though less common than 10 or 20 years ago). Many of these companies harvest timber with just a chainsaw and a skidder³. The skidder is often a cable variety that requires the operator to get out of the machine and put a chain around a log to hook it up to a cable coming from the skidder that winches the log close to the machine before the driver moves it. The machine then drags that log, and others added to the load to the landing where further processing is done with a chainsaw. In this kind of operation, usually the chainsaw operator – who may also be the skidder driver – cuts the tops and branches of the tree harvested and leaves those parts in the woods.



Cable skidder

Today, more loggers are multi-person companies – some with 10 or 20 employees. These companies usually use one or two types of timber harvesting

³ Skidder – a rubber-tired tractor that drags the tree out whole or in parts either by a cable and chains or using a grapple that grabs a pile of logs with two large tongs.

equipment. A whole-tree harvesting logging company will have at least one tracked feller-buncher harvester with a giant circular saw that cuts and then large arms that “bunch” into several stems. The feller buncher, run by one person, puts down piles of logs of all sorts so that a “grapple” skidder – a large tractor with a huge set of tongs that backs up to the pile of whole trees, and grabs them and then heads off to the landing with the load.



Tracked feller-buncher



Grapple skidder

A second common configuration of equipment for a larger logger in this region is a “cut-to-length” operation. This kind of equipment, originally designed and used in Scandinavia before being brought to the northeast US in the 1980s, includes a “processor” machine that harvests the trees. This machine may be on rubber tires or on a tracked vehicle. The difference between this harvesting equipment and the whole tree harvesting arrangement with a feller-buncher



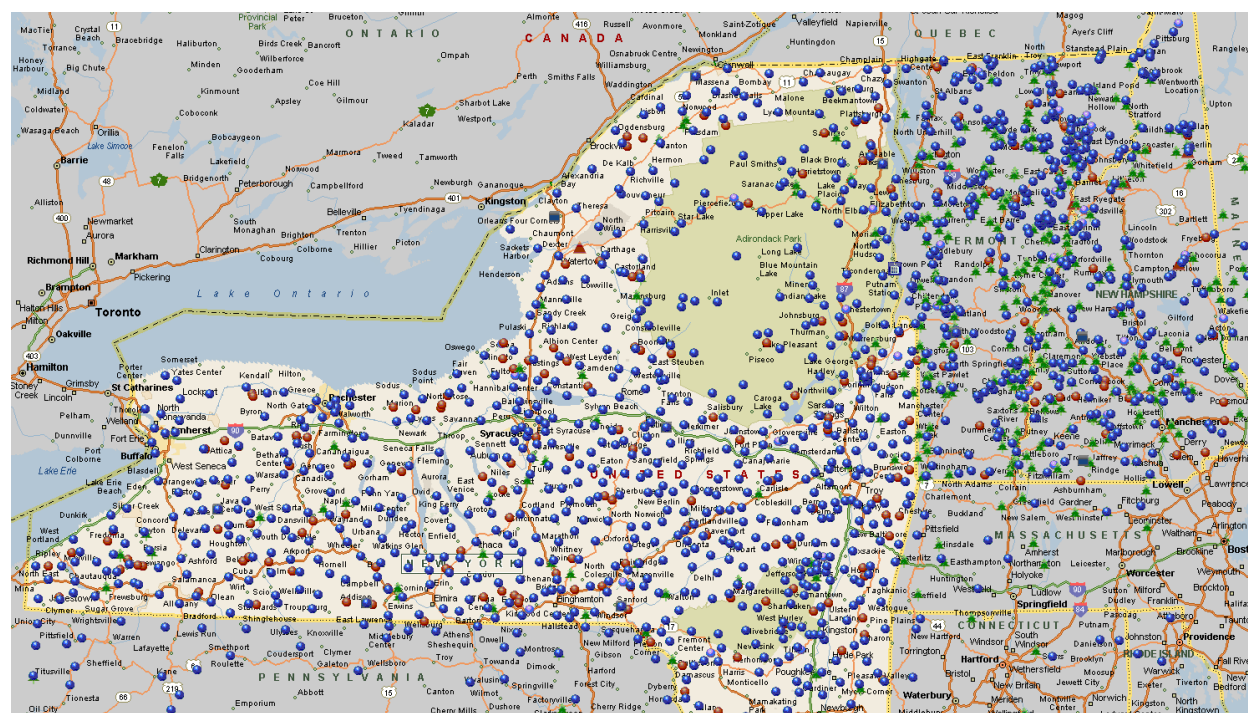
Tracked processor



Older forwarder

and grapple skidder is that the processor cuts trees into lengths or products right in the woods rather than bring the whole tree to a landing to be processed. Tree tops and branches are left in the woods or are put on the ground for the machines to drive over if the ground is wet or soft. This kind of system is gaining in use in the northeast. The one draw back is that this system cannot operate on terrain as steep as with the feller-bunch system.

Figure 14 Distribution of Primary Forest Products Industry Supply Chain in NH, NY & VT



Legend:

Loggers/Truckers



Foresters



Sawmills



Pulp and Paper Mills



Biomass Plants



Wood Pellet Mills



Concentration Yards



Truckers or trucking services are often part of the logging company but not always, especially with smaller logging companies. In those cases, independent log truckers or those that are part of other logging companies, are contracted to deliver timber products from the forest to the mill.

The sawmill sector has over 265 mills sawing hardwood or softwood (or sometimes both) timber (Figure 13). This number is an intentional under counting and represents those mills that are full-time operations and some that are very large. There is another level of sawmills in the NH, NY and VT region not reported here – the very small or part-time operations. The 265 mills in our dataset produce an estimated 95% of the volume of sawed product in the region.

We have not listed veneer mills – only a few in the region – but high end logs that are very straight with little to no defect like knots or branches may go to veneer mills. These mills peel the log like an apple peeler or slice it like making long flat strips from a cucumber – both into thin thickness sheets. These products go into plywood and other products that use a thin facing over another core stock.

There are two pulp mills in the three-state region. They are both located in the Hudson River valley of New York – on the very eastern side of the State. There are an additional 5 pulp and paper mills operating in Maine and several just over the border in Quebec, Canada that provide market for pulpwood. The Canadian mills are not listed here but they are an important part of the pulpwood market for those areas in northern NH, NY and VT.

Biomass electricity plants now number 7 in total across the three states with 4 in New Hampshire, 2 in Vermont and 1 in New York. These plants generally take in whole tree wood chips as their feedstock. Whole trees are chipped in woods before being shipped in box tractor trailers to market. Sawmill chips, which are made from the round slabs that are sawed off the round log as the product is transformed into various squared products – boards or timbers – are another feedstock used to generate electricity.

Wood pellet plants use various forms of feedstock including round low-quality logs, sawmill chips and sawdust, secondary wood manufacturing shavings, chips and sawdust as well as chips made in woods generally just from the bole (the log in the tree after the top and branches are removed).

Concentration yards are not true final primary processing markets but are locations where usually multiple timber products are purchased for later re-sale to pulp and paper and sawmill markets. There are at least 52 concentration yards in the three-state region.

State of the Primary Forest Products Supply Chain

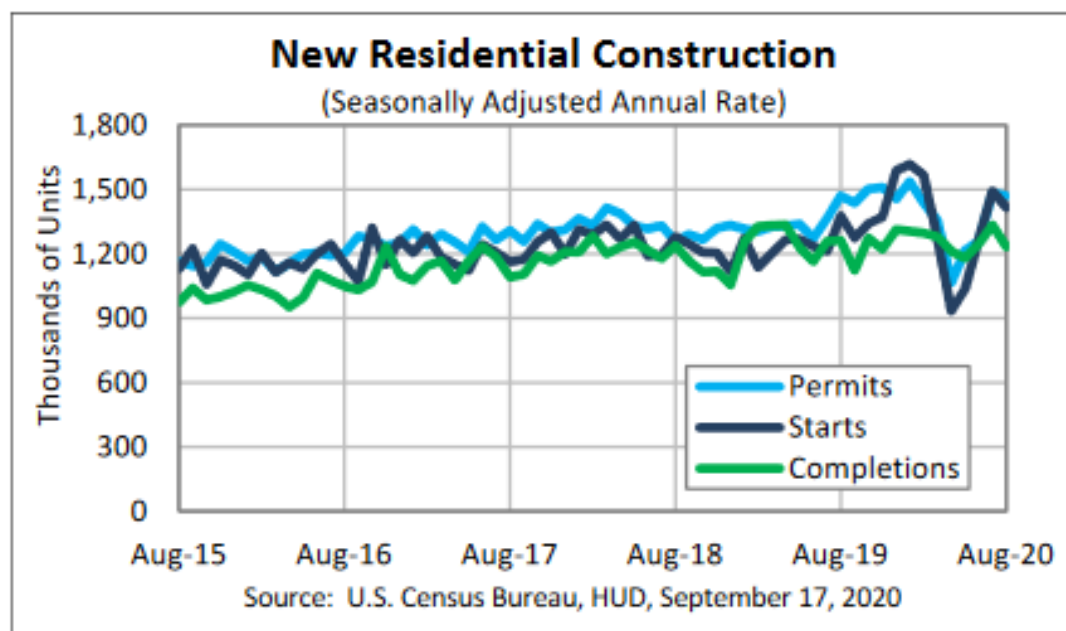
The state of the primary forest products supply chain in the three-state region is ever changing.

Biomass, pulpwood and sawlogs make up almost all of the wood harvested in the three-state region. Each is important to the sustainability of the region's forest industry, but due to the current state of the economy – only partly as a result of the COVID-19 pandemic - are facing a handful of economic challenges as well as a few opportunities.

Timber and Lumber

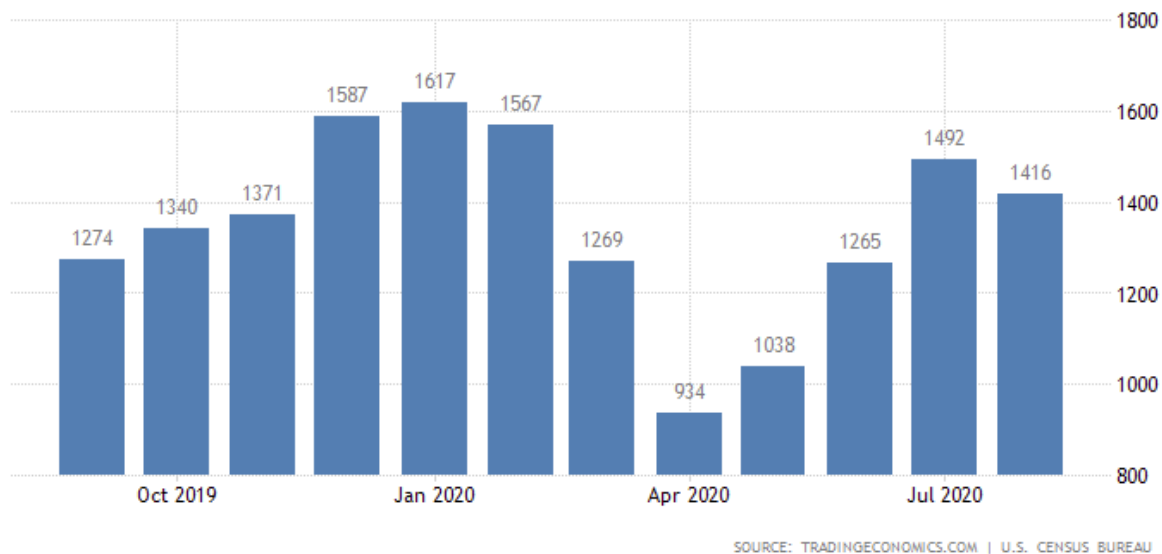
Housing starts, a reliable indicator of market health, enjoyed a sustainable climb after the housing-led recession back in 2008-10.

Figure 15 US Housing Starts 2015-2020



The U.S. housing starts surge of the last five years – almost to pre-recession levels (Figure 14) - was met with a dramatic collapse when the COVID-19 pandemic hit. Housing starts climbed again beginning in summer and are at reasonable levels in the fall of 2020 and expected to be in the 1.3 million range for the next year.

Figure 16 US Housing Starts 2019-2020 (000)



With that said, lumber prices have held reasonably steady. This is due to mills in the southeast, Pacific Northwest and Canada electing to reduce capacity and therefore limit supply to reflect the decrease in demand. Softwood mills in the northeast U.S. were affected less due to retail markets in the big box retailers and other building supply stores.

In addition, the forest industry was largely deemed essential across the U.S. throughout the pandemic, and in many places building has continued. Even with the drop in housing starts and home sales slowing nationally, home repair and remodeling has increased significantly. Home centers like Lowe's and Home Depot have reported record demand. Most of that demand is from small quantity purchases, but these "little sales" add up.

Sawmills Operations

Most Northeast mills – although not all – have been operating close to a 'normal capacity' for several years leading up to the pandemic and for the spring and mud season in 2020 that continued. Inventory of logs and sawn lumber has grown to record levels in 2020, and some of that inventory started to move as the summer led to fall in the region. A bright spot has been for hardwood mills that utilize, at least for some of their market, export markets. This recovered somewhat as workers return to manufacturing businesses in places like Asia as well as trade tariffs being lifted in second quarter 2020.

Overall, sawmills are doing reasonably well in the region, despite the effects of the pandemic.

Mill Residuals

Anyone that purchases a cylinder (log) and sells a rectangle (board) needs a market for everything that's not in that rectangle. The softwood sawmills' markets for this residue particularly have shrunk, and this is a dangerous sign for a healthy industry. Hardwood mills have been in better shape with residues because that by-product is more in demand.

The restart of Old Town, Maine's mill has been some welcome news, but has been offset by the Jay, Maine pulp mill explosion that decimated the Androscoggin Mill's pulp processing capacity in April 2020. It is still not clear whether that mill – which is currently making paper with imported pulp – will ever be rebuilt into a pulp mill.

Energy from Biomass

For the foreseeable future, it appears that woody biomass electricity generation will not be viable without public financial support. This conclusion comes from a combination of the cost to pay staff and facility operations, the fuel per megawatt-hour to run these facilities, and more. Renewable Energy Certificates are available for some facilities in the region, and for those that qualify, may be a key piece of their operations. However, once offshore wind and other lower-cost renewables establish a foothold in the region, the biomass electricity industry will largely be uneconomical. Many plants are already deemed uneconomical – hence the closure or mothballing of over half the biomass plants in the region. Half of that sector in Maine has also shut down.

In addition to wood being used for electricity, its energy can also be used for heat – specifically heating buildings. There are hundreds of biomass heating projects in commercial and institutional buildings along with thousands in the residential sector in the three-state region which have traditionally competed very well in the Northeast and other rural areas that rely on oil for heating. However, the return of low oil prices may spell limited near-term growth for wood heat although most installations of wood chip or wood pellet boilers already in place largely continue as fossil fuel prices are at historic lows. These facilities have been bolstered by the existence of Thermal Renewable Energy Certificates (T-RECs) in New Hampshire. In the region, Massachusetts has this benefit as well and soon Maine will follow suit. Heating with modern wood heat – using boilers and furnaces that use wood chips and wood pellets is a growth sector although slowed with low fossil fuel prices. Any shift up in heating oil, propane or natural gas will benefit this sector in the years to come.

Pulp and Paper

The health of pulp and paper is very mill-specific. The product mix of these mills has shown to be critical during COVID-19:

- Tissue, paper towels and wipes in very high demand;
- Some specialties (personal protective equipment, medical uses, etc.) are very strong;
- Increased packaging demand as large distribution companies like Amazon, UPS and FedEx report increased use of their delivery services;
- A drop in demand for printing and writing paper due to closure of schools and offices and halted brochure use from lack of traveling consumers.

The mills in the region are heavy to the slowed printing and writing paper sectors but are migrating, to the extent the mill configurations allow, to the growth areas. The mills in the region are older and focused on sectors that were once large (magazines, newspapers and writing/copying paper) so these facilities must diversify their product mix to stay competitive – and some are.

Some key questions for this sector are:

How will companies integrate work-from-home policies after the pandemic and what does that mean for paper demand?

Will reliance on online shopping and grocery delivery become the norm?

What market shifts will be temporary, and which ones structural?

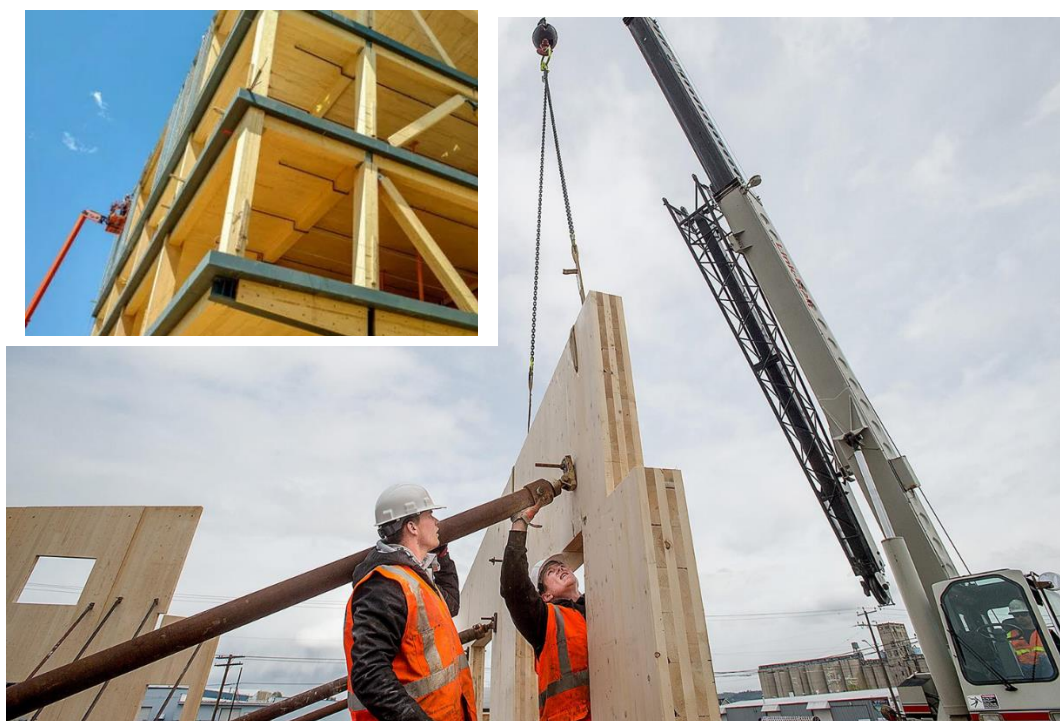
What we do know is the current COVID-19 triggered recession is bigger than anyone expected, and the economic reopening has many unanswered questions. Ultimately, the solution relies on millions of individual decisions to lead what the 'new normal' looks like. The actions of the Northeast's high-density populations in cities and suburbs will be the key to getting the economy back on its feet.

Emerging industries

There are many opportunities for NH, NY and VT forest products industries in emerging sectors of new demand for forest products.

Mass timber, and specifically cross-laminated timber (CLT) within the mass timber sector, is a market that has lots of unrealized potential in the Northeast. These large-scale, prefabricated panels can be used as a substitute for concrete and steel construction and are favorable due to their solid engineering and strong design while also being light weight.

Figure 17 **Cross-laminated timber construction**



Cross-laminated timber panel being installed on a multi-story commercial building

While there is promise for this resource and market, ground has not yet been broken on a CLT manufacturing facility in the region. Given its high potential, future plants – if built in the region – are likely to use spruce/fir lumber but recent testing has also determined that eastern hemlock and white pine can be used to make this product.

An emerging industry is a new wood-based insulation facility under construction in Madison, Maine. This plant expects to begin commercial production in 2021 and will use softwood chips to create home wood fiber insulation for the residential and light commercial construction market. Others like it could be built in the three-state region.

Companies have been looking to the Northeast for new opportunities in biofuels, biochemicals, cross-laminated timber, Nano-cellulose and more. There are many opportunities for growth in the region as the supply chain is substantial and the timber resource, further described elsewhere in this report, is robust and available.

The In-Woods Sector

Nothing described above relative to timber-using facilities in the region can occur without a strong infrastructure in the woods: foresters, loggers and truckers. This part of the supply chain gets the raw material from the woods to the market.

The closure of many low-grade timber facilities in the biomass and pulp and paper sector has put strains on the in-woods sector. The majority of the logging infrastructure in New Hampshire and Vermont, and to a lesser extent in New York, is operating way below capacity – for some as low as 40-50%. Companies can weather changed market conditions for a time but this excess capacity will not remain forever. Some loggers and truckers have parked equipment and downsized at least for the time being. Others may choose to get out of the logging business. New equipment purchases are down as one can expect.

This excess capacity can be a good thing if forest products markets begin to expand once the pandemic is behind us, hopefully in late 2021. Like with many supply chain situations, increased demand for timber will get those still in the business with parked equipment and downsized production to ramp back up again. This phenomenon has occurred time and time again in the forest products industry in the northeast – mostly recently after the recession of 2008-10 – and will happen again after the pandemic.

A concern overall, however, is that the average age in the sector is in the mid-50s. There are many programs in the northeast now training young people to enter this sector. The challenge for a new business start-up with a younger person is the substantial capital requirements for getting in with the logging equipment described earlier. An investment of over \$1 million is not uncommon, even with used equipment, depending on the configuration. Fortunately, certain local lending institutions and other national ones focused on this sector such as Farm Credit, are available for financing.

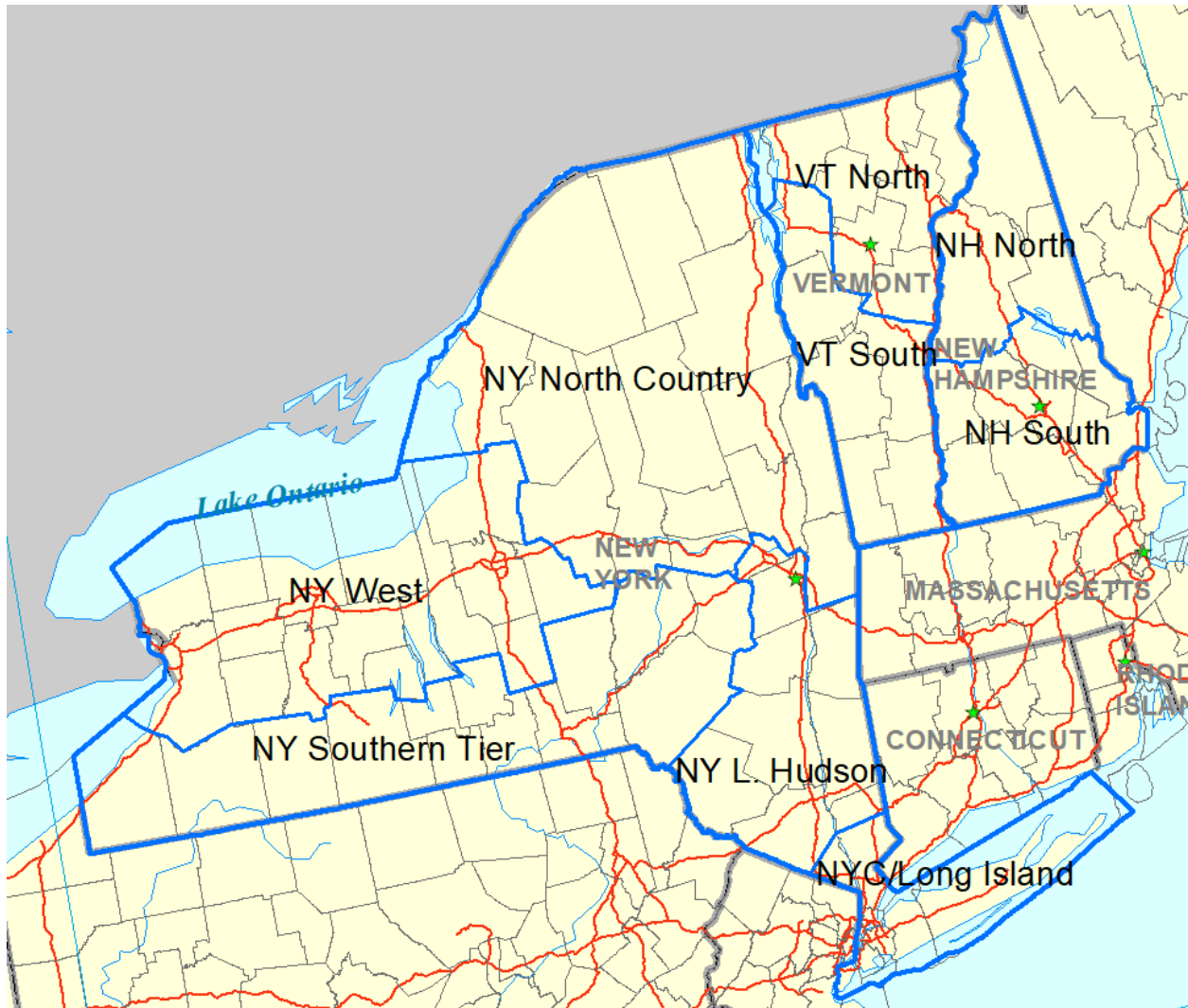
C. Transportation infrastructure

Public Road Systems

The NH, NY and VT region is blessed with a good road infrastructure that allows for getting timber from the woods to primary processing. More importantly, the infrastructure, especially the interstate highway system and major state highways, provides an elaborate network of routes to get product from primary processing to market.

The interstate highways system can be found in Figure 18. While comprehensive, there are areas with gaps in this federal highway system including northern New Hampshire, parts of northern New York and southern Vermont.

Figure 18 Interstate Highways of NH, NY & VT



Source: US Dept. of Transportation

When the state and other public roads are added to the mix in Figure 19, the coverage is astounding with some explainable exceptions. NH has 33,328 miles of public roads. NY has 239,763 miles of public roads and VT 29,276 miles.

In New Hampshire, the north central portion of the state contains the 800,000+ acres White Mt. National Forest where few roads cross and which is largely mountainous. Other areas in northern New Hampshire with sparse public road systems are in unincorporated townships and largely privately owned. Many

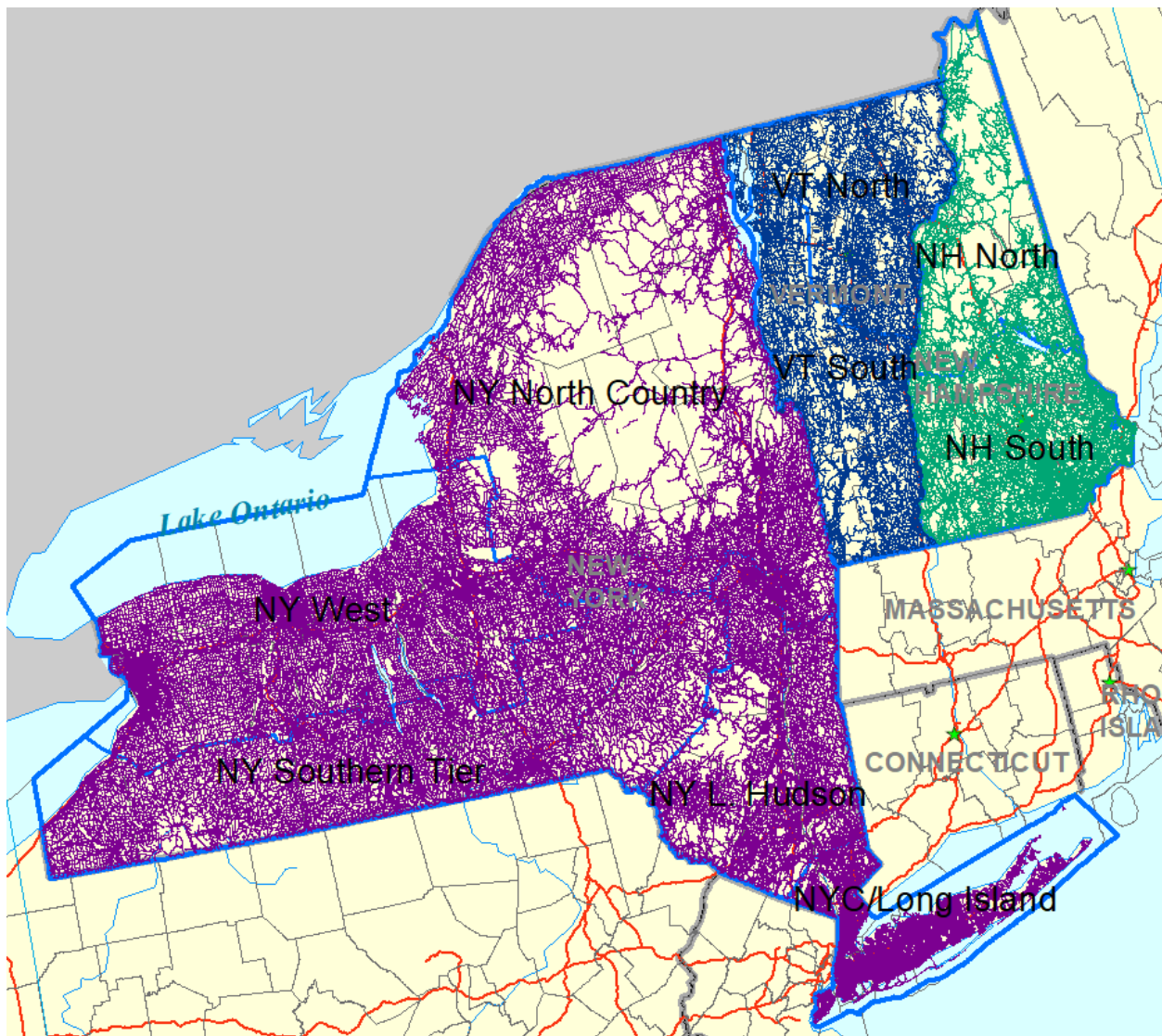
private roads are found in these areas, not all of which are closed to public traffic.

In New York, the Adirondack Park in the northern part of the State which is over 6 million acres of public and private lands shows no public roads largely in the areas of public lands although large private ownerships are found there with private road systems. The Catskills Park, also a State Park, is found in the Lower Hudson region and this over 700,000 acre Park is also lightly roaded. Finally, the Tug Hill plateau, in the northwest portion of New York near Lake Ontario, is also lightly roaded with public roads though mostly privately owned.

In Vermont, the areas with fewer public roads include the north/south spine of the Green Mountains which includes the Green Mt. & Fingers Lakes National Forest. The so-called Northeast Kingdom of the Green Mt. State in the northeast corner of the State has few public roads as well. This area is a mix of large private ownerships and some public ownerships.

The lightly public roaded areas in these three states do not pose a major problem for the forest products industry supply chain because private roads allow for access to all but the most remote locations in the three-state area where timber is available and accessible. The public road systems in these states are not a hindrance to supply chain transportation.

Figure 19 Public Road Systems: NH, NY & VT



Departments of Transportation: NH, NY & VT

Truck Weights

A note about truck weight limitations that affect the usefulness of the public road transportation systems in NH, NY and VT. There are not uniform truck weight limitations across the 3 states for the most common configuration of trucks used in forest products hauling: the 6-axle tractor-trailer and the 4-axle log truck. Vermont, as part of a study with Maine that ended in 2015 now allows 6-axle tractor trailers up to 99,000 lbs gross weight on all roads in the State

including the federal highway system. For New Hampshire 99,000 lbs gross weight is allowed on the state highway system, but only 80,000 lbs is allowed on the federal highway system in the Granite State. New York weight limits are like New Hampshire except that there is a grandfather system that allows up to 143,000 lbs on a limited portion of the interstate highway system.

The smaller truck configuration of 4 axles is generally 60,000 lbs in all three states.

Having different truck weights in adjacent states can be a challenge, but truckers know these limitations and work around them to haul legally in all states when traveling with forest products from one state to another.

Rail

Commercial rail service is generally not used for transport of forest products in the three-state area except in specific mill circumstances and then, generally, only for short hauls. Class I railroads, those railroads with over \$250 million in annual revenue in 1991 dollars, do most of the commercial rail traffic in the U.S.

More than 600 freight railroads operate in the United States. Each Class I railroad operates in multiple states over thousands of miles of track. The seven Class I railroads are BNSF Railway Co., CSX Transportation, Grand Trunk Corporation (Canadian National's operations), Kansas City Southern Railway, Norfolk Southern, Soo Line Corporation (Canadian Pacific's operations), and Union Pacific Railroad (Figure 20).

Except for a few spurs through New York State, Class I railroads are generally not found to any great extent in the three-state region.

Some local exceptions that are non-Class I are occasionally used to a particular mill site but that generally is due to a difficulty or limitation of truck traffic at or near the mill site. These short hauls keep truck traffic to a minimum at the mill site itself and trucks unload their timber cargo at a rail siding outside the immediate mill area but it might be only a few miles from the mill.

Figure 20 Class I Railroads in the U.S.



Source: US Dept. of Transportation

Ports

The eastern seaboard of the U.S. is blessed with many deep water ports (Figure 21). For the forest products industry in NH, NY and VT, some of these ports are useful for finished product delivery and for shipping raw logs harvested in the region. Ports are rarely, if ever, used as a means for the region's forest products mills to access raw material. The northeast has ample supplies of timber as described in other sections of this report.

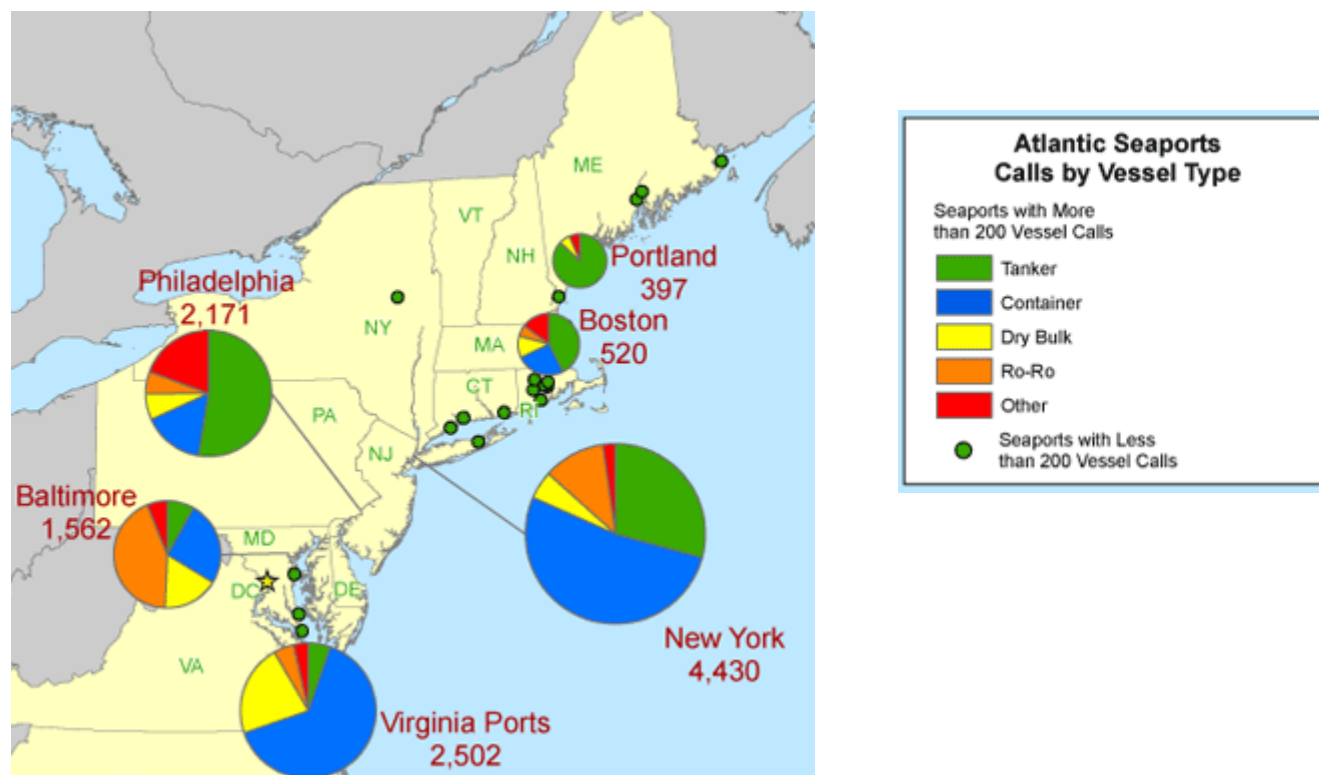
A significant set of ports are accessible to the whole three-state region. On the Atlantic, key ports include Newark, NJ, New York, NY, Boston, MA, Portsmouth, NH and Portland, ME. Additionally, there is Albany, NY up the Hudson River with a deep water port and via Lakes Erie and Ontario into the St. Lawrence Seaway through Montreal.

Figure 21 Ports of the Eastern U.S.



U.S. Bureau of Transportation Statistics 2019

Figure 22 Major Atlantic Ports by size in Northeast US



U.S. Bureau of Transportation Statistics 2019

Northeastern ports are receiving more and more commercial product shipping each year although the COVID-19 pandemic slowed activities in the second and third quarters in 2020. Increases in shipping from these ports are expected in the coming decade, at least for the major ports accessible to the three-state region (Figure 22).

Not surprisingly the coronavirus pandemic delivered a heavy hit to U.S. port volumes in the spring of 2020.

According to Freight Waves⁴ and other public news reports, the Jacksonville, Florida, port saw a 21% drop in roll-on/roll-off (ro-ro) shipments year-over-year in March of 2020. Similar findings came from ports from New Jersey to Maine. Shipping volumes as of fall 2020 are within 5% of 2019 levels at some ports.

Accessible ports are not a limitation for growth in the forest products sector should expanded or new markets arrive in the coming years.

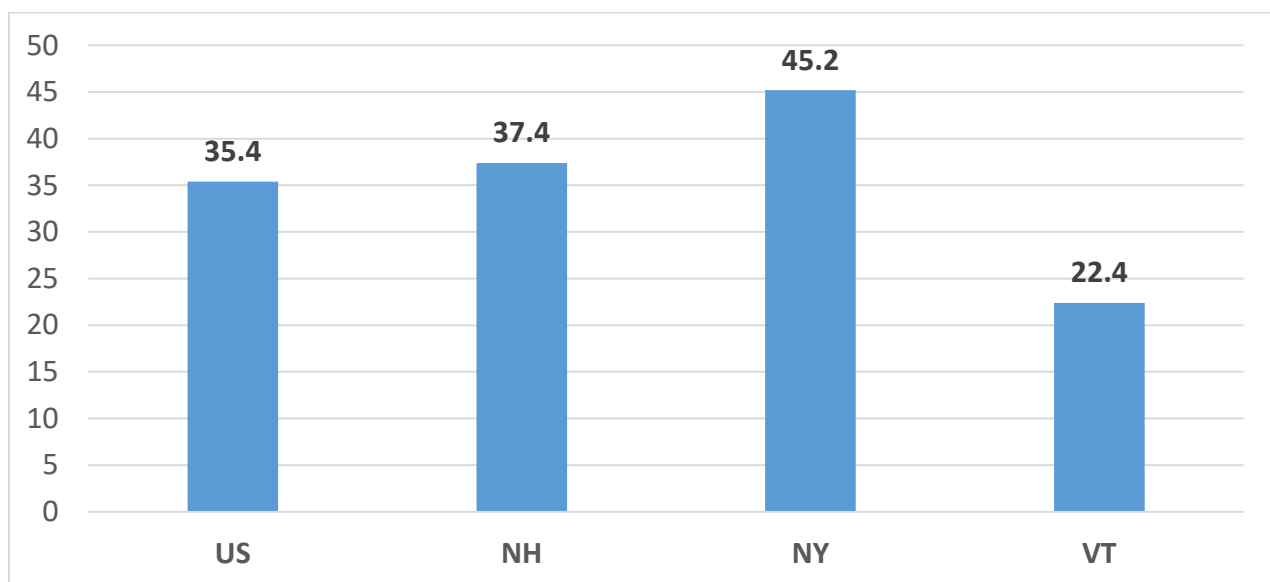
⁴ <https://www.freightwaves.com/>

D. Internet

Access to high-speed internet is becoming increasingly important to all industries, including the forest products industry, for many reasons. For forest industries, some current and emerging technologies require constant internet access to allow for raw material optimization, remote monitoring, and machine learning. It is expected that this will become increasingly important in coming years.

Figure 23 below shows the average download speed for the United States, as well as each state in the region.

Figure 23 Average Download Speed by State (Mbps)⁵



In addition to speed, connectivity is critical, answering the question “what percent of a state or regional economy is connected to high-speed internet? The Federal Communications Commission defines broadband as having a download speed of at least 25 Mbps, and an upload speed of at least 3 Mbps.⁶

The figures below show the percent of census blocks receiving broadband coverage by state and county.

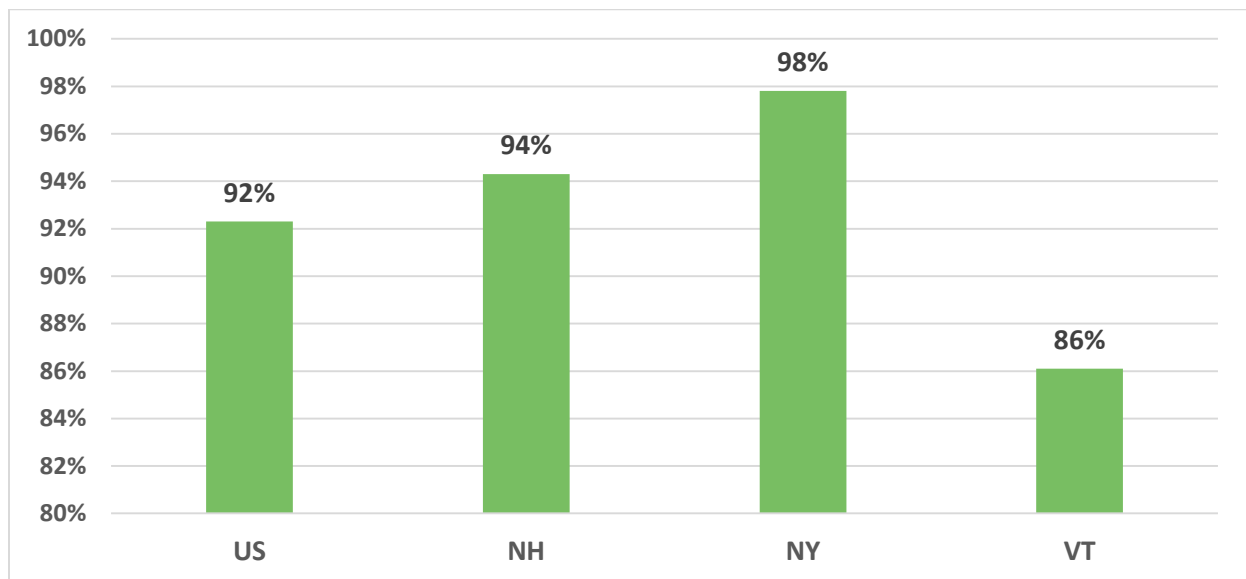
⁵ Broadband Now. *US States With the Worst and Best Internet Coverage 2018*.

<https://broadbandnow.com/report/us-states-internet-coverage-speed-2018/>

⁶ Federal Communications Commission. *2018 Broadband Deployment Report*.

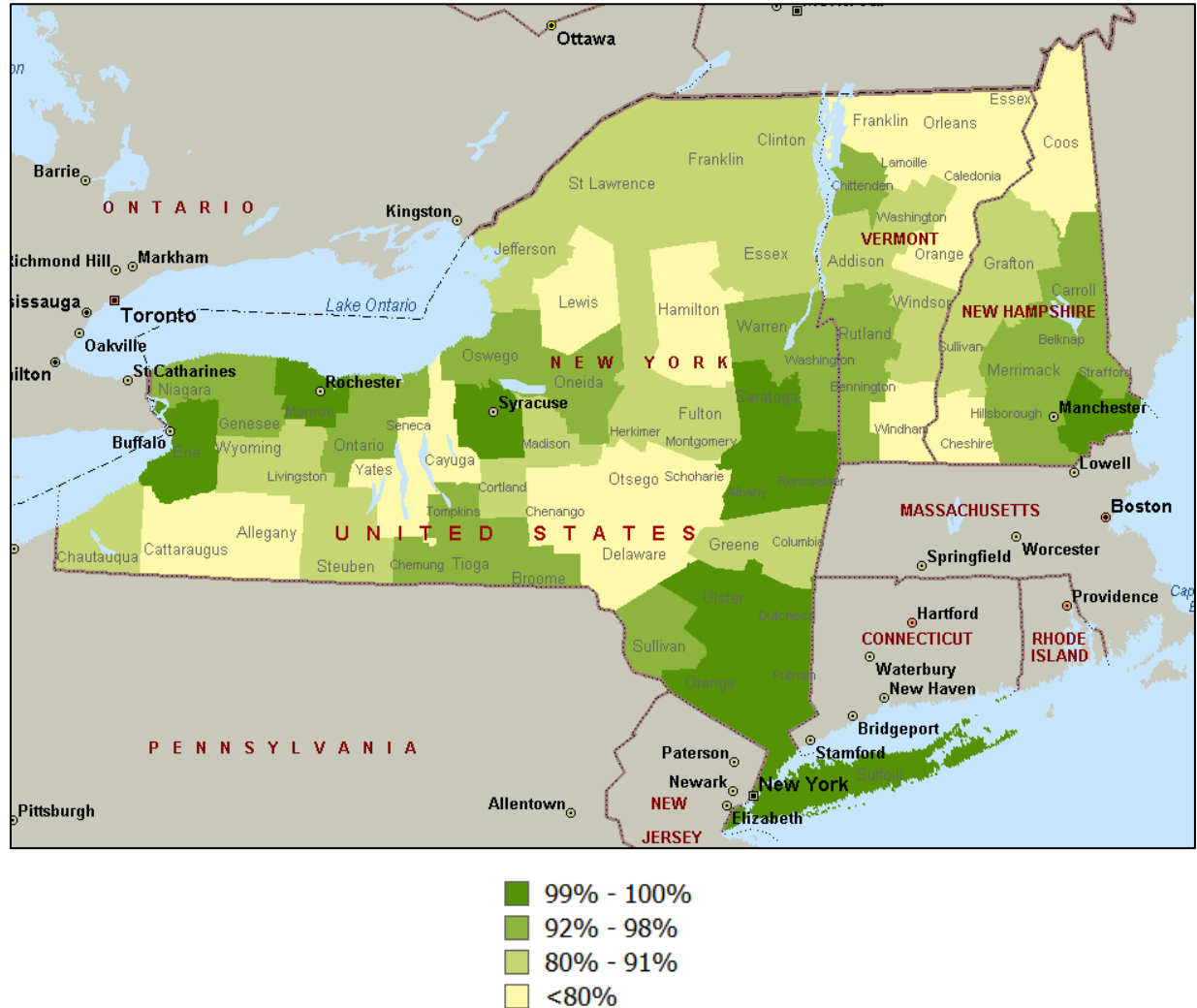
<https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report>

Figure 24 **Broadband Internet Coverage by State**⁷



⁷ Federal Communications Commission. *2018 Broadband Deployment Report*.
<https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report>

Figure 25 Broadband Internet Coverage by County⁸



E. Mobile Phone Coverage

Mobile phones – for both data and voice applications – are becoming increasingly important for modern communications. The Federal Communications Commission defines “advanced telecommunication

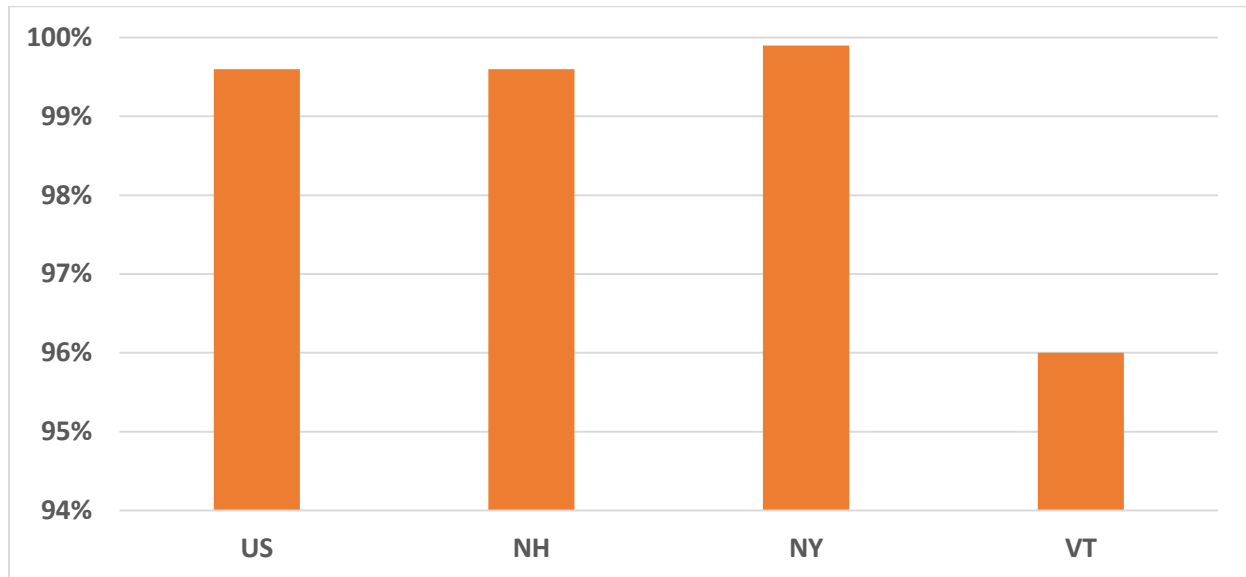
⁸ Federal Communication Commission. 2018 Broadband Deployment Report. Appendix F2 - Americans with Access to Fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps Services By County - Segmented by Urban and Rural Areas.

<https://docs.fcc.gov/public/attachments/DOC-349001A1.xlsx>

capacity" for mobile phones as having an advertised download speed of at least 5 Mbps, and an upload speed of at least 3 Mbps.⁹

The figures below show the percent of census blocks receiving advanced telecommunication coverage by state and county.

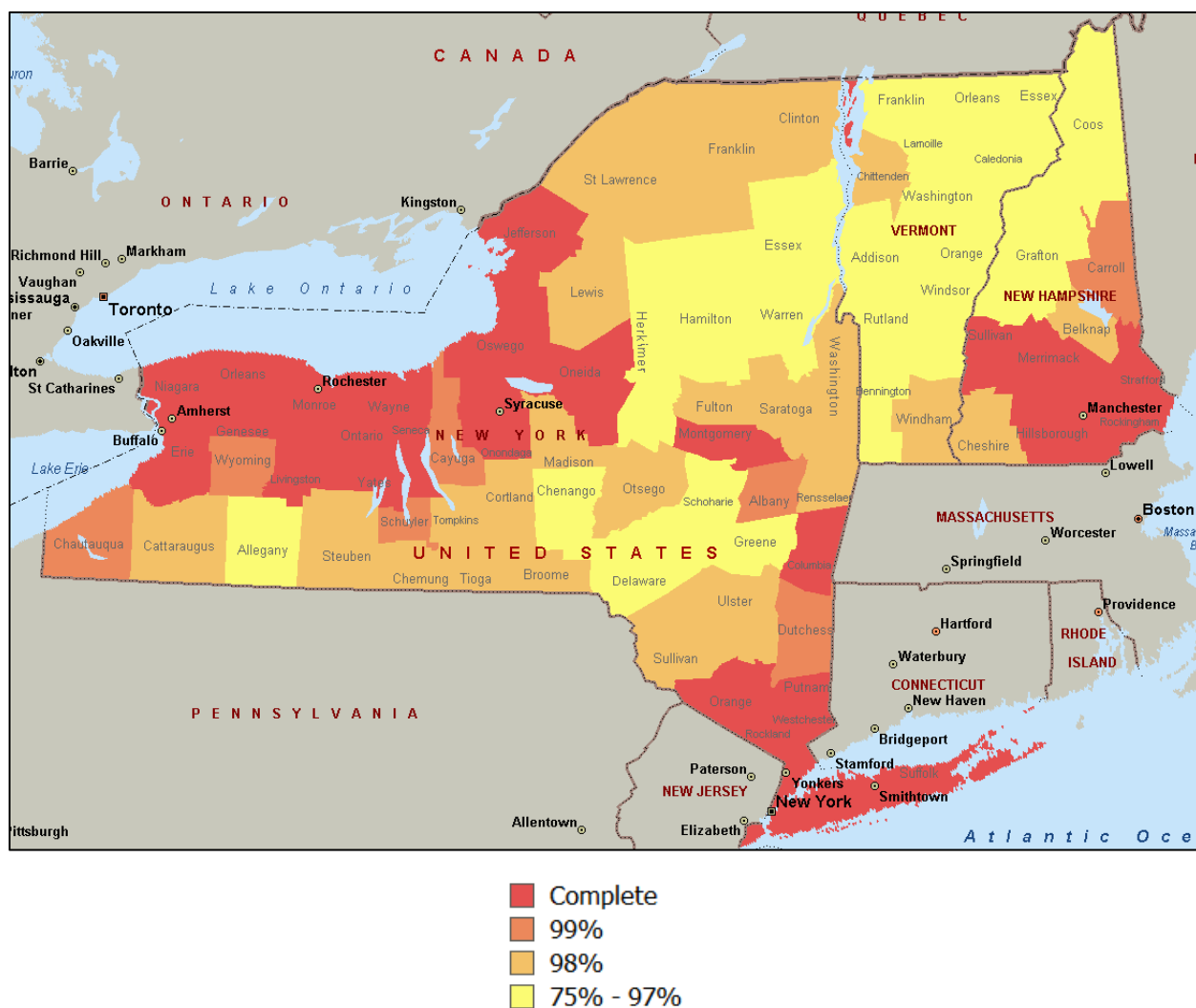
Figure 26 Mobile Phone Coverage by State¹⁰



⁹ Federal Communications Commission. 2018 Broadband Deployment Report. <https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2018-broadband-deployment-report>

¹⁰ Federal Communication Commission. 2018 Broadband Deployment Report. Appendix F2 - Americans with Access to Fixed 25 Mbps/3 Mbps and Mobile LTE 5 Mbps/1 Mbps Services By County - Segmented by Urban and Rural Areas. <https://docs.fcc.gov/public/attachments/DOC-349001A1.xlsx>

Figure 27 Mobile Phone Coverage by County



F. Electricity Cost

Many forest products manufacturers are electricity intensive, and the price of electricity can be an important factor in the economics of a facility's operations. The following figures show the average electricity rate for industrial use (most relevant for forest industries) and all users of electricity in the United States and by state. It is important to note that within each state there are multiple electric utilities, each with a unique service territory and in some cases with competitive suppliers. Rates that a user pays for electricity may depend upon their utility service territory, competitive supplier, time of use and other factors.

Figure 28 Industrial Electric Rate, \$ per MWh¹¹

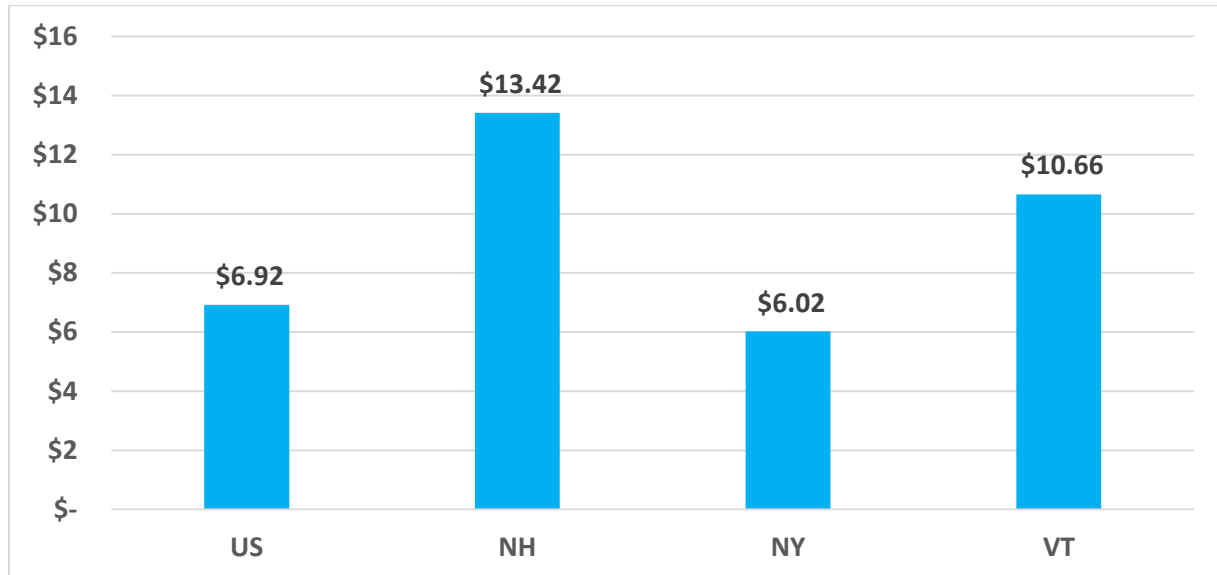
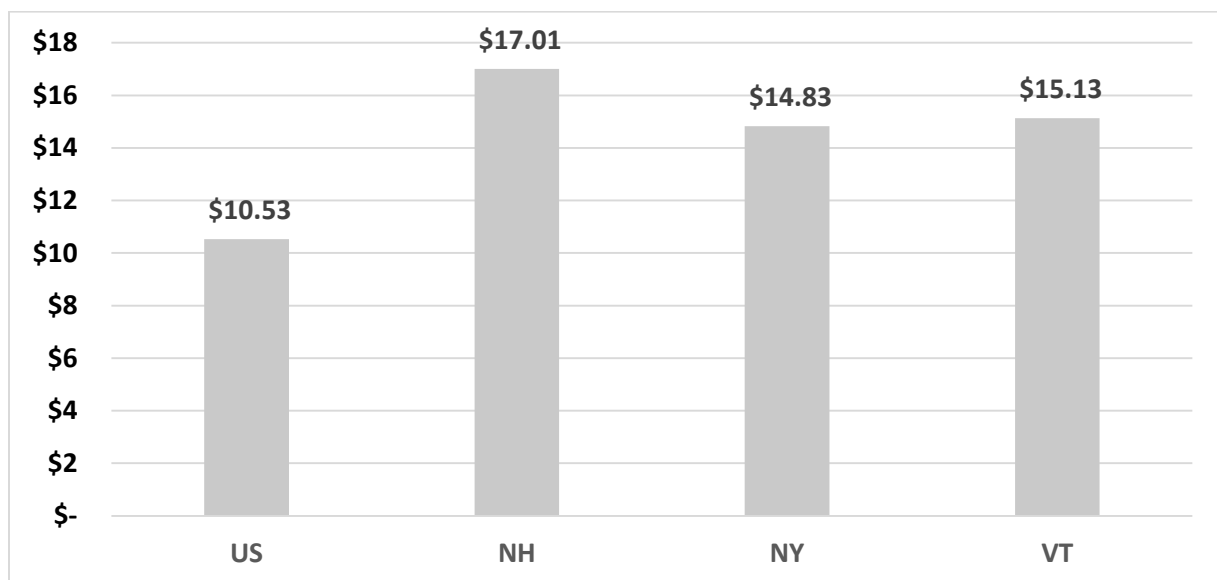


Figure 29 Electric Rate - All Users, \$ per MWh¹²



¹¹ US Department of Energy, Energy Information Agency. *State Electricity Profiles*. December 31, 2019. Accessed at <https://www.eia.gov/electricity/state/>

¹² US Department of Energy, Energy Information Agency. *State Electricity Profiles*. December 31, 2019. Accessed at <https://www.eia.gov/electricity/state/>

G. Workforce – Education Level

An educated workforce is increasingly important to forest industries, as jobs require increasing and changing levels of skill and aptitude. The following figures show the percent of the working-age population with different levels of formal education.

Figure 30 Highest Level of Education Level by State (2014 – 2018 data)¹³

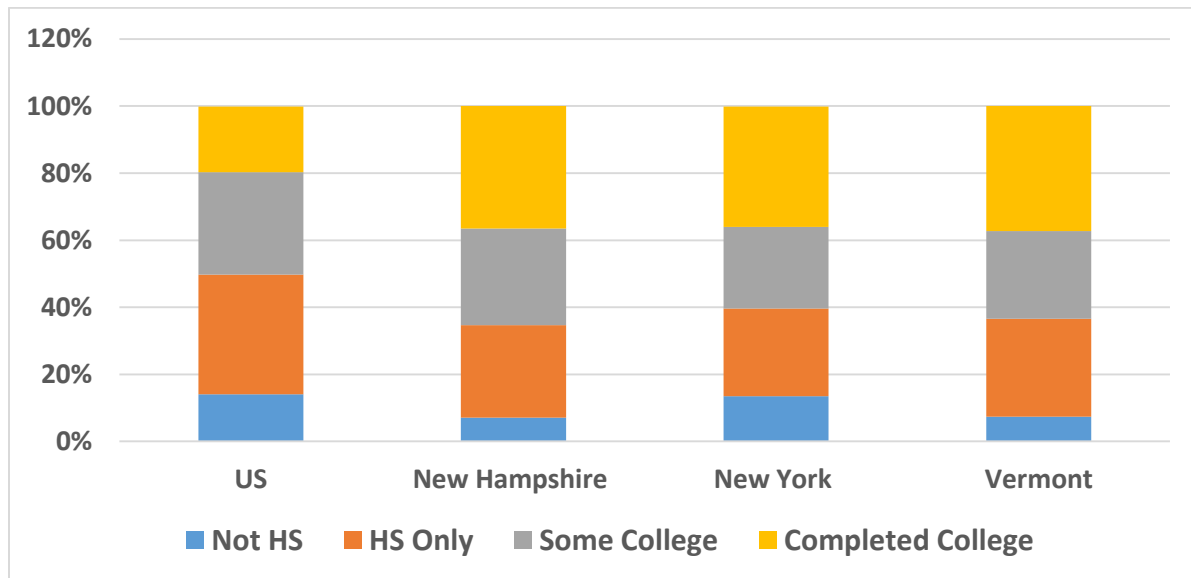


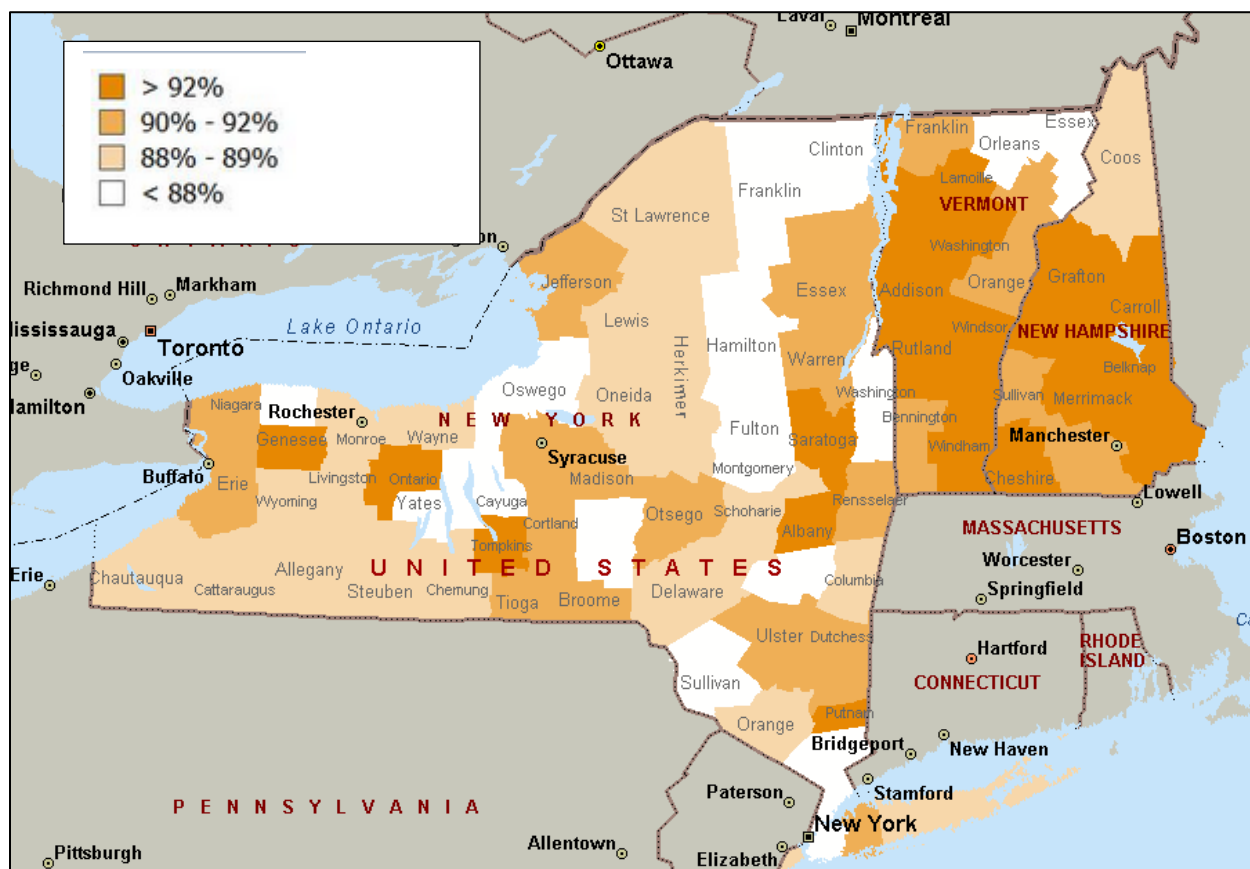
Figure 31 Highest Level of Education by State (2014-2018 data)¹⁴

	Not High School Grad	High School Only	Some College	Completed College	High School or Above
US	14.0%	35.7%	30.6%	19.6%	85.9%
New Hampshire	7.1%	27.6%	28.8%	36.5%	92.9%
New York	13.5%	26.1%	24.4%	35.9%	86.4%
Vermont	7.4%	29.2%	26.1%	37.3%	92.6%

¹³ USDA Economic Research Service. *Highest Level of Education Attainment*. <https://data.ers.usda.gov/reports.aspx?ID=17829>

¹⁴ USDA Economic Research Service. *Highest Level of Education Attainment*. <https://data.ers.usda.gov/reports.aspx?ID=17829>

Figure 32 Minimum High School Education by County (2014 – 2018 data)



Source: USDA Economic Research Service

H. Capital Competition

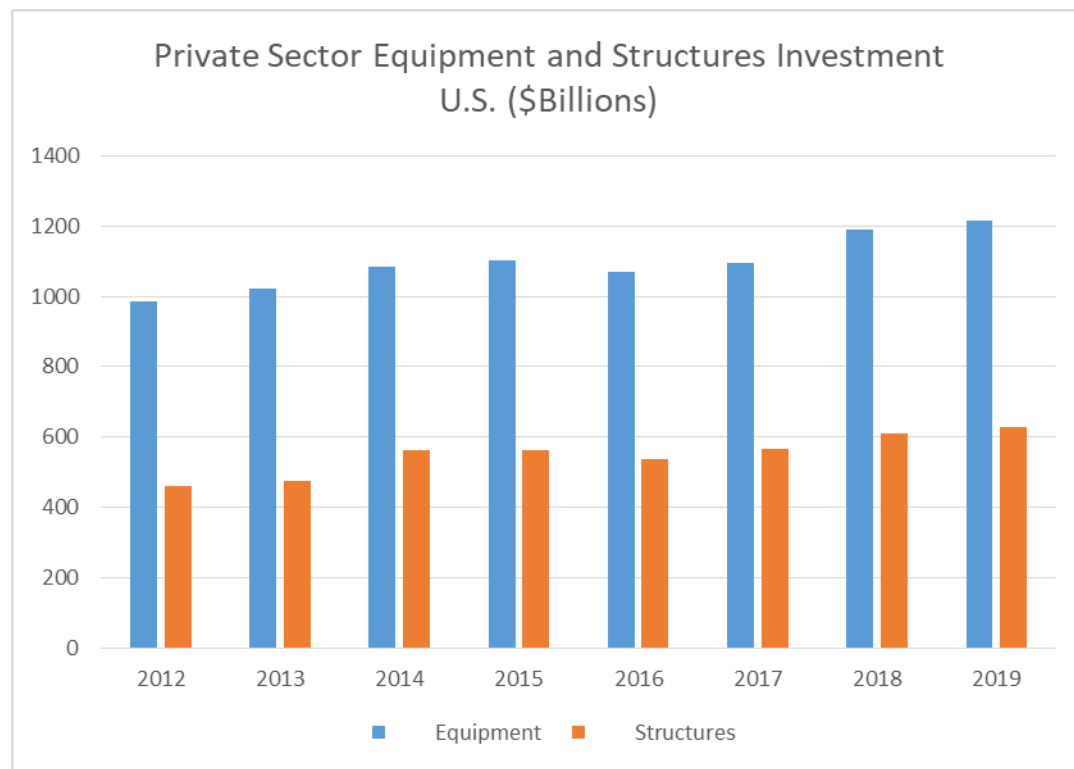
In order for existing forest products markets to expand and new ones to be built in the New Hampshire, New York and Vermont region, capital – in the form of commercial financing of debt and equity lending – needs to be available to those interested in developing forest products markets.

The U.S. Dept. of Commerce Bureau of Economic Analysis (BEA) has a wealth of information on all economic issues relative to the economy of the United States. A subset of that data has to do with capital expenditures – those funds used to build things, including manufacturing facilities. While available nationally, this data is not available at the state or multi-state level due to concerns about individual company proprietary expenditure information becoming available at

these smaller scales. But the national data is helpful in understanding industry capital expenditure levels – even by sector.

Figure 33 shows overall industry capital investment – in both equipment and buildings – increasing steadily from 2012 to 2019, the last year the data is available. Combined, this data shows 2019 expenditures of over \$1.84 trillion dollars in 2019, up from \$1.44 trillion in 2012.

Figure 33 U.S. Industry Capital Investment 2012-20

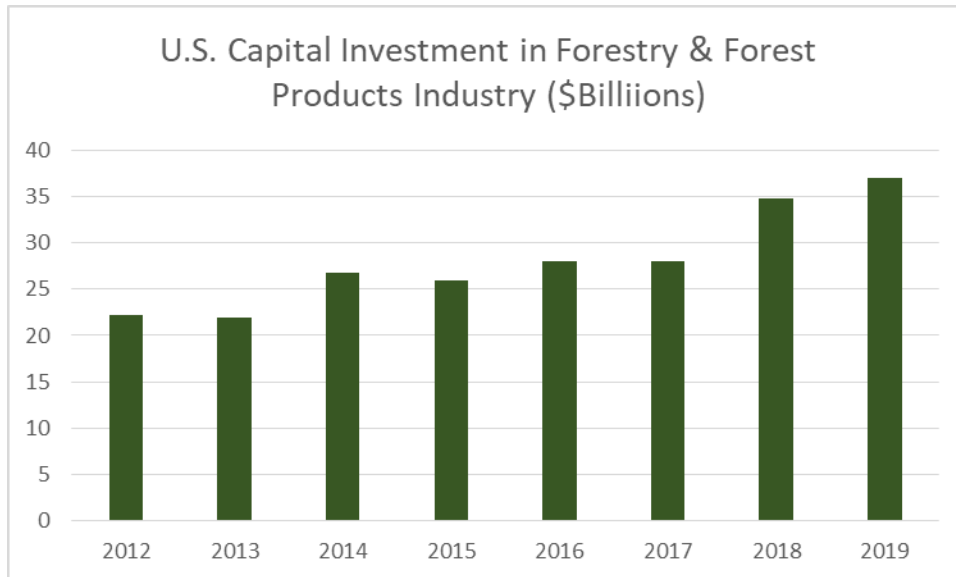


Source: U.S. Bureau of Economic Analysis

In Figure 34 we are able to focus directly on capital expenditures done in this same 2012-19 timeframe for the forest products industry. This data shows that in 2012, forest industry capital expenditures were \$ 22.2 billion. In 2019, these expenditures climbed to \$37.1 billion.

This suggests that forest products industry capital expenditures are on par with all manufacturing capital expenditures, an important comparison.

Figure 34 **Capital Investment in US Forest Industry 2012-20**



Source: U.S. Bureau of Economic Analysis

While we are not able to drill down this data to just show the New Hampshire, New York and Vermont region, we do have anecdotal information about capital expenditures in the forest products industry in the region. We will not name companies due to the sensitive nature of this information but a shortlist for the same 2012-19 period includes:

- Two new wood pellet mills;
- A new, large sawmill;
- Several sawmills developing wood-fired co-generation of electricity and heat at their locations;
- Complete new planer mill operation at a large sawmill;
- New paper machines, a very large capital investment, at several pulp and paper mills;
- New sorting and grading systems;
- New mat building facilities;
- Re-start of a moth-balled pulp and paper mill;
- Installation of brand-new sawing head-rigs (main sawing machine) at several sawmills;
- Investment in a brand-new wood fiber insulation manufacturing plant at a brownfield site.

The known anecdotal capital investments in the forest products industry sector in the three-state region (the list above and others) total over \$2 billion.

More importantly in these discussions is how these three states compare to other forested states in the country where capital investment might be in competition. A more thorough benchmarking of the region is done in a later section of this report to be developed later, but an overview of this topic includes the following points:

- The three-state region is attractive because it is so close to finished products markets along the northeast urban megalopolis from Boston to New Jersey;
- The overall supply chain infrastructure, though strained in recent years more fully described earlier in this report, is still robust;
- The corporate tax climate in this region is similar to the Lakes States & Pacific Northwest but at a disadvantage with some southern states;
- Labor availability and cost is similar in the northeast to the Lakes States and Pacific Northwest but is generally more challenging and expensive than certain southern states;
- Anecdotal information also suggests the south as an area where capital expenditures would be in competition with the northeast as more new sawmills and pellet mills – to name two manufacturing sectors – have been built in recent years than in the northeast.

I. Assessment of Legislative and Regulatory Issues Impacting Forest Products Industry in the Region

This section assesses some current legislative and regulatory issues of interest to companies that may be considering locating to or expanding their businesses in New Hampshire, Vermont, or New York. It is not intended to be a comprehensive assessment of all issues that may be of interest to the manufacturing sector, but only those current (or anticipated in the near future) issues that relate primarily to forest management, viability of wood products supply chain, and manufacturing of products, goods or services that utilize wood harvested within the supply distribution regions of these states.




General Business Climate for Viable Forest Products Industry

The chart below summarizes several metrics that compare the three states in terms of general business climate issues. These are factors that would be

expected to have implications to the viable operations of any business, regardless of sector or product. Included are metrics that compare general business taxes, property taxes, fuel taxes and energy costs, and labor related taxes and fees. Also included are metrics commonly used to compare the burden imposed on business by the functions of state government, and other, more subjective indices such as a “tax climate index” and a “freedom ranking” based on a composite analysis of fiscal, regulatory and personal freedom issues.

This analysis was compiled by information provided by each state’s economic development agency, as listed here, from which a great deal of additional information is available:

- [New Hampshire Department of Business and Economic Affairs](#)
- [Vermont Economic Development Authority](#)
- [Empire State Development](#)

STATE TO STATE COMPARISONS 2019				
		NH	VT	NY
				
TAXES				
	Corporate Income Tax Rate	7.70%	8.50%	8.50%
	Sales Tax & Use Tax %	None	6	6
	Internet Sales Tax	None	6	6
	Tax Exemptions			
	Manufacturing Machinery	No Tax	Exempt	Exempt
	Office Equipment	No Tax	Taxable	Taxable
	Custom Software	No Tax	Exempt	Exempt
	Modified Canned Software	No Tax	Exempt	Taxable
	Tangible Personal Property	No Tax	Taxable	Taxable
	Sales & Use - Weighted Average of County & City Rates	No Tax	0.0014	0.0014
	Top Personal Income Tax %	0%	9.0	9.0
	Estate, inheritance/gift taxes beyond federal	No	Yes	Yes
	Property Tax			
	On Land & Buildings, as share of personal income	5.6	5.2	4.62
	Telecommunications Tax %			
	State/Local Sales Tax	0.00	6.50	8.44
	State/Local Wireless Rate	8.50	8.50	8.50
	Workers Compensation Premium Index Rate	1.70	2.09	2.09
	Unemployment Insurance Tax % (New Employers), 19	1.70	1.00	1.00
	Unemployment Insurance Tax Wage Bases, 19	\$14,000	\$15,600	\$11,400
	Unemployment Insurance Tax/ Per Employee, 19	\$238	\$156	\$331

	Unemployment Insurance Number of Benefit Weeks	26	26	26
	Gasoline Excise Tax (cents per gallon)	23.8	31.2	25.8
	Diesel Excise Tax (cents per gallon)	23.8	32.0	24.0
	State Property Taxes as Percentage of Personal Income	5.4%	5.1%	4.5%
	Small Business Tax Index: 2017 (1= Best 50= Worst)	32	44	43
	Tax Climate Index (U.S. Tax foundation), 2019 Overall Ranking (1= Best 50= Worst)	6	41	49
FINANCIAL & GOVERNMENT COMPARISONS				
	Tax burden - State/Local, % of Income 2019	6.9%	10.8%	13.0%
	State Government Tax Revenue, 2017 (in thousands)	\$2,496,719	\$3,127,523	\$79,678,037
	Per Capita State Government Tax Collections, 2017	\$1,870	\$5,017	\$4,017
	Per Capita State Government Debt Outstanding, 2019	\$5,428	\$3,479	\$7,247
	State Government Bond Rating 2017	Aa1/AA/AA+	Aaa/AA+/AAA	Aa1/AA+/AA+
	Cost of Living Index, 2018	10930.0%	11870.0%	13570.0%
	Legal Liability- Lawsuit Climate (1=Best; 50=worst) , 2017	5	2	29
	Growth in Disposable Income (1960-2010) (1-Highest - 50 Lowest)	4	3	5
	Median Household Income (2017 Rankings) (1-Highest 50-Lowest)	2	17	20
	Personal Income Per Capita (2018 Rankings) (1-Highest 50-Lowest)	7	19	3
	State Corruption Ranking, 2018 (1=Most corrupt; 50= Least corrupt)	34	37	31
	2018 Forbes Best States for Business (1=Best, 50=Worst)	34	47	26
	Freedom Ranking- Fiscal, Regulatory, Personal (1=best 50=worst)	2	46	50
ENERGY & ENVIRONMENT				
	Electricity, January 2019, (Cents Per Kil Hr.)	19.9	16.7	17.3
	Natural Gas, January 2019 (Dollars Per Thousand Cubit Feet)	16.16	12.01	12.24

Specific Legislative and Regulatory Issues of Interest to Forest Products Industry

All three states actively encourage growth and expansion of the forest products industry as a matter of official policy. State forest action plans (required by the federal government in order for states to qualify for federal assistance from the US Forest Service, State and Private Forestry) make repeated mention of the vital role that a viable forest products industry plays in providing markets that support sustainable forestry, jobs in rural areas, mitigation of climate change, and significant contributions to state economies. State forest action plans are important documents guiding policy priorities and can be accessed here:

- [New Hampshire Forest Action Plan](#)
- [Vermont Forest Action Plan](#)
- [New York State Forest Action Plan](#)

Nonetheless, the forest products industry, like many industrial sectors, face challenges in the legislative and regulatory realm. The following analysis identifies a short list of current or anticipated legislative or regulatory issues with implications to companies considering expansion or relocation to New Hampshire, Vermont or New York. For purposes of this analysis, these issues have been limited to the following: statewide forest practice and land use regulations, climate and energy legislation or regulations, and taxation as it relates specifically to forest industry or forest land.

For each state, we have identified key issues, summarized the issue and its status, and described the potential implications of the issue to any company that may be considering expanding or relocating within one of these three states. We do not attempt to cover local land use or development regulations.

New Hampshire

Issue	Summary	What's Under Current Consideration	Implication to Forest Industry Retention or Recruitment
Low Grade Markets	NH has seen a significant decline in markets for low quality/low-grade wood resources due to closure of wood-fired power plants and the regional loss of markets for pulpwood over the last ten years.	Legislation providing rate support and/or enhanced renewable energy certificate values for wood-fired power plants has been attempted over the last three years but vetoed by the governor. Other legislation to bolster the continued viable operation of a 75 MW wood-fired power plant in Berlin NH also faces uncertainty.	Loss of low-grade markets has severely impacted loggers and truckers and made it more difficult for sawmills to obtain necessary log supplies through integrated harvests. Loss of these markets has also diminished returns to private forest landowners and made it more difficult for landowners to conduct long-term forest improvement harvesting.
Net Metering	Favorable net metering policies for site-owned distributed renewable electricity generation provide incentives for manufacturing industries with high electricity needs, such as forest products manufacturing, to invest	Reform of net metering policies have been intensely debated by the legislature over the last three years. Significant improvements have been supported by the legislature but opposed by the executive	A lack of a strong net metering policy has discouraged investment in self-generation of electricity by forest products manufacturers and led to a decline in solar industries looking to grow in NH.

	in self generation such as through installation of solar photovoltaics or biomass combined heat and power.	branch. Vetoes have created ongoing uncertainty.	
Alteration of Terrain Permitting	Significant disturbance of land requires state approval of "alteration of terrain" permits.	Historically, timber harvesting has been exempted from this requirement, with the filing of an "intent-to-cut" form serving as a permit by rule. Recent litigation filed against the NH Department of Environmental Services has called the legality of this exemption into question. NH DES is now considering a major overhaul of the administration of this statewide land use permitting process, with implications to any significant land disturbing activities.	A more onerous alteration of terrain permit process could increase costs and compliance burden for forest landowners and loggers, thereby reducing returns from forest management and potentially impacting timber supply to industry.
Wetlands Regulation	Regulation of wetlands and water quality impacts during timber harvesting are reasonable in NH, but some environmental organizations and legislators are calling for more stringent buffer laws, despite a lack of evidence that timber harvesting is causing significant impacts of wetland function and water quality.	Recent legislation proposing more stringent buffer requirements has been introduced over the last several years but failed to pass.	Wetland and water quality buffer laws will limit timber harvest over significant acreage of NH, with resulting potential loss of timber supply.
State Budget Deficits	The COVID-19 pandemic has had a significant impact on state revenues from taxes and other sources. The governor and the legislature will have to take a hard look at expenditures and new potential revenues to offset looming deficits.	There is speculation that looming budget deficits could put pressure on NH's current use program, which provides preferential taxation for undeveloped forest land. Deficits may also prompt raids on dedicated funding sources important to the forest products industry, such as the Land and Community Heritage Program, and the Renewable Energy	Increased property taxes on forestland could lessen the viability of forest ownership and long-term management. Loss of services and programs from NHDNCR and UNH CE could impact industry and landowners in various ways.

		Fund. Deficits could also impact important services and programs important to the forest products industry and landowners of the NH Department of Natural and Cultural Resources, and UNH Cooperative Extension.	
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Vermont

Issue	Summary	What's Under Current Consideration	Implication to Forest Industry Retention or Recruitment
Act 250 Reform	Act 250 is Vermont's land use and development law, enacted in 1970 at a time when Vermont was undergoing significant development pressure. The law provides a public, quasi-judicial process for reviewing and managing the environmental, social, and fiscal consequences of major subdivisions and developments in Vermont. It assures that larger developments compliment Vermont's unique landscape, economy and community needs.	Act 250 is seen by many manufacturing industries as overly burdensome and expensive to comply with. A legislative commission formed in 2018 to develop consensus around broad reforms of Act 250. Agreement around these reforms collapsed during the 2020 session but a small number of changes were adopted, only to be vetoed by Governor Scott. Act 250 reform is expected to be a major focus of continued legislative debate in 2021.	In some cases Act 250 permits have been denied for forest industry expansions or new industrial development, or made compliance so burdensome that projects have been abandoned. Continued uncertainty around regulatory reforms can discourage business planning.
Global Warming Solutions Act	Comprehensive greenhouse gas emission reduction legislation passed over Governor Scott's veto in the 2020 session. The measure would require the state to reduce greenhouse gas pollution to 26% below 2005 levels by 2025. Emissions would need to be 40% below 1990	The Act establishes a Climate Council to develop policies to achieve the GHG emission reductions, and directs the Agency of Natural Resources to develop implementing regulations within two years. The process for appointing the Climate Council will begin soon. The regulations will	While unclear at this time, the act could have consequences to any manufacturing industry with greenhouse gas emissions, tough implementation of regulatory limits or penalties such as carbon taxes. The act could potentially benefit forest

	levels by 2030 and 80% below by 2050, with a goal of economy-wide carbon neutrality by 2050. The act will "cut carbon pollution, help rebuild the economy, build healthy and resilient communities, promote the use of our natural and working lands to capture and store carbon, and adapt to our already-changing climate."	impact producers of greenhouse gas emissions as well as forest landowners.	landowners and wood products to the extent that it recognizes the important role forests and wood will play in offsetting GHG emissions through sequestration.
Stormwater Management Regulations	VT moving ahead with new stormwater management regulations, to be fully implemented by 2026	In rulemaking now; new regulations set to apply to all businesses with >3 acres impervious surface, including those that were grandfathered under original EPA clean water act requirements	Will result in significant new compliance costs for all businesses, e.g. sawmills and wood product manufacturers with woodyards >3 acres may see new requirements.
State Budget Deficits	The COVID-19 pandemic has had a significant impact on state revenues from taxes and other sources. Vermont Governor Scott and the Legislature will have to take hard look at expenditures and new potential revenues to offset looming deficits.	There is speculation that the looming budget deficit could impact Vermont Use Value Assessment to the extent that it may lessen revenue sharing to towns based on the amount of land they have in current use. Deficits could also impact important services and programs of the VT Agency of Forests, Parks and Recreation.	Increased property taxes on forestland could lessen the viability of forest ownership and long term management. Loss of services and programs from VT FPR could impact industry in various ways.
Low Grade Wood Markets	Region has seen significant decline in low grade markets due to closure of pulp mills and wood-fired biomass electric generation plants.	Ryegate (VT) Power Station (15 MW), an important market for low grade wood in VT and NH, is seeking new 10-year rate order that requires legislative approval.	Some environmental groups are opposing Ryegate's new rate order without new regulations on sustainable wood sourcing and/or requirement that Ryegate utilize waste heat. Both would increase costs and potentially reduce returns to forest landowners, or lead to the owner of Ryegate deciding not to operate the plant.

New York

Issue	Summary	What's Under Current Consideration	Implication to Forest Industry Retention or Recruitment
Climate Leadership and Community Protection Act	NY passed among the nation's most aggressive greenhouse gas emission reduction legislation in 2019, setting goal for 100% carbon neutral economy by 2050. State now developing regulations to achieve this goal, to be implemented over next three years. The law does not allow biomass-based fuels to serve as potential offset projects, and does not recognize biomass generated electricity as a renewable energy resource.	In an initial step, NYS Department of Environmental Conservation has proposed GHG emission limits that effectively view use of wood biomass as energy resource as the same as fossil fuels in terms of GHG emissions. This is the first step in a series of regulatory actions that will roll out over the next several years to achieve interim and long-term GHG emission reductions.	Any industry that emits GHG through its manufacturing process could see strict regulations, carbon taxes and/or other restrictions that discourage this economic activity. Conversely, forest landowners may realize benefits to the extent that retention of forests and management to optimize carbon sequestration is viewed favorably by these regulations. Also, use of wood products in structures will likely be encouraged as a means of achieving carbon offsets.
480-A Program Reforms	NY's 480-A Program provides preferential property tax rates for undeveloped, managed forestland like current use programs in other states. Very little of NY's 17 million acres of forestland is enrolled in the program because of difficult requirements and a mandate that the state budget reimburse municipalities for "lost" tax revenue. Requirements that acreage in the state is enrolled in 480, has received considerable attention in recent years from advocates for lower forest	NY's 480-A Program has received considerable attention in recent years from advocates for lower forest property taxes, and conversely, from advocates that want to make forest practice requirements to qualify more stringent. Differing interests have been unable to reconcile opposing points of view, and municipalities have opposed any efforts to strengthen forest landowners' benefits without increased revenue sharing from the state.	NY's current use taxes on forestland are among the highest of any northeastern state. Inability to lower property tax burden will further diminish the viability of forest ownership as local costs of government services continue to increase property tax burdens. This will impact timber supply and force some landowners to convert their lands to non-forest uses.

	property taxes, and conversely, from advocates that want to make forest practice requirements in order to qualify more stringent.		
Invasive/Endangered Species	New York has a concentration of invasive species impacting terrestrial and aquatic ecosystems. Invasive plants, insects and diseases are having a major impact on forest health in many regions of the state. In part as a consequence of this, NY is considering strengthening endangered plant and animal species protection.	Various legislation addressing control of invasive species has been considered in recent years, and large increases in funding to manage invasive species infestations has been considered by state government. Legislation has also been proposed to regulate activities of private landowners where documentation exists of impacts more stringently on listed threatened or endangered plant and animal species from proposed state permitted land management activities.	Efforts to stop or slow the spread of invasive species that impact forest health are generally viewed favorably by forest landowners, but could have impacts on ability to harvest and sell timber. Endangered species regulations could increase costs of forest management and potentially reduce timber supply.
Water Quality/Stream Regulations	NY municipalities are adopting timber harvesting regulations because they perceive state regulation of stream crossings and wetlands impacts from timber harvesting as overly lax.	NY State Department of Environmental Conservation has sought adoption of a harvest notification process that would include municipal notification requirements. Industry has sought protections from municipal regulations and uniform water quality and stream regulations statewide, in order to provide greater strength to state's "right to harvest law" that is intended to shield private forest owners from unreasonable restrictions on timber harvest.	Increased regulation of timber harvesting activities can increase costs and complexity of managing forestland and discourage long-term investment and retention of timber producing lands, thereby impacting
Energy Costs	NY has among the highest electric rates for manufacturing businesses and any northeastern state.	The Public Service Commission imposes significant ratepayer assessments to fund efficiency and renewable energy programs. The industry seeks a reduction in these assessments to lower costs, and a shift to	High electricity costs are a major competitive factor in the viability of the forest products industry, as they are for all energy intensive trade exposed industries.

		more cost effective and market driven solutions to achieving renewable energy and energy conservation objectives.	
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For businesses considering expansion within these states, or location of new manufacturing facilities, each state has a forest products industry trade organization that monitors legislative and regulatory matters of interest to their members. These organizations are linked below.

[New Hampshire Timberland Owners Association](#)

[Vermont Forest Products Association](#)

[Empire State Forest Products Association](#)

J. Conclusion

The three-state region of New Hampshire, New York and Vermont has tremendous forest resources and a robust forest products infrastructure. The opportunity for expansion of existing forest products markets as well as creation of new markets is strong.

While the opportunities are different among the three states primarily due to the differences in regulatory and legal frameworks in the states, forest products markets expansion is clearly possible in all three state jurisdictions. Combined with other reports in this series, potential developers of forest products markets have a strong base of information to start their explorations.

K. Sources

Departments of Transportation: States of NH, NY & VT

Empire State Development

Federal Communications Commission

Freight Waves

North East State Foresters Association – *Northern Forest Biomass Project Evalidator*

National Woodland Owners Survey

NH Dept. of Business & Economic Affairs

NH Division of Forests and Lands

NH Division of Air Resources

NH Wood Energy Council

NY Division of Lands and Forests

Tradingeconomics.com

UNH Cooperative Extension

US Bureau of Transportation Statistics

US Census Bureau

USDA Economic Research Service

USDA Forest Service Forest Inventory & Analysis

US Dept. of Commerce, Bureau of Economic Analysis

US Dept. of Energy, Energy Information Agency

US Dept. of Transportation

VT Department of Forests, Parks & Recreation

VT Economic Development Authority

Private database of capital expenditures in the forest products industry – Innovative Natural Resource Solutions, LLC

<https://broadbandnow.com/report/us-states-internet-coverage-speed-2018/>